

# ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS (ESIA) FOR THE PROPOSED ESTABLISHMENT OF PROCESSING AND WASHING FACILITY FOR THE ARTISANAL AND SMALL-SCALE GOLD MINERS AT ITUMBI HAMLET, MATUNDASI WARD, CHUNYA DISTRICT IN MBEYA REGION

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# EXECUTIVE SUMMARY

## Introduction

The National Environmental Management Council (NEMC) and Mining Commission, through the World Bank funded project named Environmental Health and Pollution Management Project (EHPMP) intend to construct an Artisanal and Small-Scale Gold Mining (ASGM) Gold Ores Processing and Washing Facilities at Itumbi Village/Kitongoji, Matundasi Ward in Chunya District, Mbeya Region, Tanzania. The mineral right of the area is owned by Mr. Vicent Bruno Minja through PML0671MBY who also own the surface right through a consent from the local authority. Currently, the licensed area is active conducting gold mining activities. The site operations started in 2014 and currently is producing about 150 bags of gold ore per day. More than 250 people are involved in mining and processing activities in the mineral right area. The project in the area will be used as demonstration center for the safe handling of Mercury in the ASGM sites. It will be equipped with appropriate Personal Protective Equipment's (PPEs) for gold ore processing. The facilities will be handled to the Mineral right owner to operate under the agreed terms and conditions with the PIT and other beneficiaries. Other similar demonstration centers will be constructed in the selected regions with more concentration of ASGM namely Geita, Mwanza, Mara, Shinyanga, Singida, and Songwe.

The Environmental Management Act, Cap 191 and the Environmental Management (EIA and Audit) (Amendment) Regulations, 2018 requires that ESIA be undertaken for all new projects that may cause adverse environmental and social impacts. The First schedule of the Regulations categorized the Extractive Industry Projects such as small-scale mining and related activities as borderline projects (Type B1 category), which may or may not require ESIA study. Upon registration with the Council (NEMC) the project was categorised as B2 project that required preparation of the detailed Project Brief. The study was done and a detailed project brief was prepared. The Environmental Management Act, Cap 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF) were observed in the study.

## Project Overview

Artisanal and Small-Scale Gold Miners (ASGM) use mercury in gold recovery but the entire process is dangerous to human health and the environment because amalgamation is done by bare hands and the amalgam is heated in open air to drive away the mercury. Available literatures indicate 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. In response to threats that Mercury poses to human health and environment, the Government has signed a Grant Agreement with World Bank, as an implementing agent, the Global Environment Facility (GEF) to finance the EHPMP. The project aims to strengthen the institutional capacity to manage and regulate mercury use in Artisanal and Small-scale Gold Mining and to introduce alternative technologies to mercury for gold recovery in ASGM subsector. Establishment of demonstration centers for Gold Ores Processing and Washing Facilities is one of the ways to manage and regulate mercury use in the Artisanal and Small-scale Gold Mining to partly address the mercury associated health and environmental impacts to miners and surrounding communities as noted.

Based on the project concept, the proposed project will comprise of Crushers, Sluicing box, Washing bay/pond, Collection water pond, Panning and amalgamation pool, Amalgam burning chamber/room, Water storage tank, Water pump and Area for storage of mercury-contaminated tailings. The facilities for processing and washing gold ore will have infrastructures to protect the environment from water to be contaminated with mercury and these will include pavement on sluicing/washing and amalgamation areas, drainage channels surrounding sluicing/washing area for collection and recycling of water from sluicing/washing, shading/roofing of gold processing area to protect the structures from rain water being

falling into an amalgamation pool and lining/paving the area for storage of mercury-contaminated tailings to protect environmental from water pollution.

### **Project Location**

The project site will be located at Itumbi Milimani area, Itumbi Kitongoji, Matundasi Ward, Chunya District, Mbeya Region, Tanzania. The site is located about 34.5 Kms from Chunya District Headquarter via Matundasi centre. Matundasi is about 21 Kilometers from Chunya CBD along the tarmac Chunya – Makongorosi Road and the site is about 13.5 Kilometers from Matundasi on Northern side. The site is also about 4 kilometers on the west north of the Itumbi Village centre. The coordinates of the site are S 08°21'34.00" E 33°17'26.00"). The site is accessible through earth road.

### **Description of the Environment**

The project site is characterized with a number of abandoned mining pits from previous mining activities. The mining activities did not affect much the vegetation cover of the area as still the area has mature tree species and bushes and disturbed grasses. The vegetation of the area is miombo woodland like most part of the Chunya Districts. It is well preserved compared to other areas of mining activities within the district and the dominant species at site include *Brachystegia spiciformis*, *Brachystegia boehmii*, and *Julbernardia globiflora*. The soils are light brownish to yellowish clay soils and on the lower areas features greyish to black clay soils. The terrain of the project site is flat inclined towards the eastern side. Thus, the overland flows towards the eastern side on the plains which act as depository. Further to the east about 4 kilometers is a small tributary of Lupa River. Lupa River is about 6.5 kilometers from the site towards the same direction, it flows toward Songwe River that drains into Lake Rukwa. The area falls under Lake Rukwa Basin. Within the Mining license there are active mining activities to include underground mining through established pits in which there are 48 pits as well as central area with facility for gold ore washing and processing. There are 14 crushers, 11 washing area and amalgamation area where mercury is used. Cyanidation using VAT Leaching is also used to extract gold at the area. The earmarked proposed site is about 60 meters to the central area and about 80 meters to the site office.

### **Stakeholder Engagement**

Stakeholder consultations were carried out, including interviews and meetings with officials from national and local government Authorities as well as local communities in the project area. One-to-one interviews with individuals, based upon a list of general topics or questions and partly based on an open discussion were conducted. Focused group discussions were also used to gather issues and concerns from special groups. In establishing the public's views concerning the proposed project, the stakeholders were provided with an introduction letter expressing the need for the study and asking the stakeholder to raise their concerns freely. Notices were posted at village offices requesting stakeholders to raise their concerns through written or verbal communications. Consultation with stakeholders indicated that, stakeholders were supportive for the project due to its relevance as Mercury is widely used and preferred than other methods of gold ores processing. Thus, its safe use to protect one's health and surrounding environment was positively conceived.

### **Impact Assessment**

The study assessed the potential environmental and social impacts of the proposed project. A standard methodology for impact identification was used to define the scope for the analysis, including a checklist/matrix approach, stakeholder input and professional judgement. Both qualitative and quantitative methodologies were employed to collect and analyse the gathered data. The analysis found that the proposed project will increase awareness on proper usage of Mercury during gold processing operations to ASGM and thus safeguarding the miner's health and surrounding environment.

Potential negative impacts/risks identified by the study include Loss of /disturbance of biodiversity (flora, fauna and ecosystem), soil erosion, traffic accidents, occupational and safety hazards, land degradation at the source of construction materials, public health hazards due to construction waste, spread of HIV/AIDs, prevalence of GBV and gender inequality issues, impairment of local air quality and noise pollution during development phase. Project construction has a relatively short duration (approximately 1 to 2 months for the construction works) and a limited impact footprint. The Project is also expected to have negative impacts during the operation phase, such as impaired air quality from crusher emission, noise pollution, pollution of land and water resources from mercury contaminated tailings, contaminations of land from poor wastes management, risks to exposure to HIV/AIDs and occupational health and safety hazards. None of these impacts identified considered severe after mitigation. With mitigation measures, all negative impacts identified in the study are expected to have a residual significance rating of minor or lower (Table E1).

**Table E1: Summary of impacts**

Potential Impacts	Significance Value	Residual Significance
<b>Mobilization/Construction phase</b>		
Loss of /disturbance of biodiversity (flora, fauna and ecosystem)	Low	Minor
Accelerated soil erosion	Low	Minor
Noise pollution	Low	Minor
Air pollution due to dust emission	Low	Minor
air pollution due to noxious gas emission	Low	Minor
Land degradation at the sources of construction materials	Moderate.	Minor
Pollution of land and water resources from hydrocarbons leaks and spills	Low	Minor
Public health hazards due to construction waste	Moderate.	Minor
Environmental pollution from poor management of construction materials	Low	Minor
Community health and safety risks	Moderate.	Minor
Occupational health and safety hazards	High	Minor
Increased incidence of diseases transmission including HIV/AIDs and STDs	Moderate	Minor
Potential risk and hazards associated with labour	Moderate	Minor
Health and safety risks due to influx of construction workers	Low	Minor
High prevalence of GBV in the project area	Moderate	Minor
Gender inequity in employment	Moderate	Minor
Employment opportunities	Moderate	Minor
<b>Operation phase</b>		
Improved working condition of miners	High	Major Positive
Acute and chronic health effects due to exposure to toxic materials	High	Major Negative
Pollution of land and water resources from mercury-contaminated tailings	Moderate	Minor
Impaired air quality	Moderate	Minor
Noise pollution and vibration	Moderate	Minor
Public health hazards from sewage	Moderate	Minor
Electrical and electronic waste impacts to human health and the environment	Low	Minor

Occupational health and safety hazards	Moderate	Minor
Non-user-friendly buildings for persons with disabilities (PWDs)	Moderate	Minor
Community Health and safety potential risks and impacts	Moderate	Minor
Creation of employment opportunities	Moderate	Major Positive
Increased income/ revenue/ induced development	Moderate	Major Positive
Improve local livelihoods from increased business opportunities	Moderate	Major Positive
<b>Decommissioning phase</b>		
Loss of employment	High	Minor
Public health hazards from tailings	High	Minor
Noise pollution and vibration	Low	Minor
Air pollution due to dust emission	Low	Minor
Soil and water pollution	Moderate	Minor
Occupational health and safety hazards	Moderate	Minor

### Alternatives Considered

The general principle involved in identifying the option(s) of the proposed project is to ensure that the option chosen would result in optimal social, economic and environmental returns. A number of sites were subjected to screening criteria. The criteria included; - activeness of the site in terms of ASG mining activities; closeness to environmental sensitive features like protected areas and natural water sources as well as residential areas; free from land issues including consent from PML owners for setting up the facility without compensation; and local stakeholders' supportiveness of the site. The earmarked site fulfilled all the noted factors and hence considered for the project.

Zero option was considered to demonstrate the condition without project changes on site and with changes on site as far as environmental, social and economic aspects are concerned. It was learnt even without the project the site is subjected to the mining activities as it is within mining licensed area with active ongoing mining activities. Thus, no significant environmental benefits will be realized even without the project, however without the project would mean foregoing on all positive impacts the project will bring in the area. Turning this part of land into compatible economic activities with positive impacts far beyond the core area (awareness to ASGM of the large area) is something cannot be easily ignored. The option is for the project as it will aid towards safeguarding the health of artisanal small scale gold miners as well as protecting the surrounding environment from haphazard use of mercury in the area.

### Mitigation Measures and Environmental and Social Management Plan (ESMP)

The project will implement mitigation measures, designed to avoid or reduce identified potential impacts on environment. The proposed mitigation measures are presented in chapter 7 are summarised in an ESMP. The ESMP included in Chapter 8 has been designed to support the successful implementation of the Project while respecting and conserving the social and environmental aspects of the country.

### Environmental Monitoring Plan

An Environmental Monitoring Plan has been developed to monitor the efficiency of the environmental mitigation measures specified in the ESMP. It supports the ESMP by maintaining a record of environmental performance and enabling adjustments to be made to mitigate environmental and socio-economic impacts during the project's lifetime.

### Cost-Benefit Analysis

The EIS presents an assessment of the project, in terms of negative impacts, compared to the socio-economic benefits that will not happen if the project is not implemented. Environmental cost benefit analysis is assessed in terms of the negative versus positive impacts. The potential benefits of the project, in terms of social benefit are substantial. Similarly, the environmental impacts can be reasonably

mitigated and the financial resources needed to mitigate negative impacts, when compared to the required investment, are relatively small.

### Decommissioning

The preliminary decommissioning plan has been developed. It is envisaged that the Project removal will be done three months after closure and continue for two months. Within the first three months the proponent will inventory all components that need to be handled over, removed and or disposed. This inventory will include building structures, debtors and creditors to be settled. This information will assist in the preparation of the environmental assessment study for approval by NEMC.

### Conclusion

Based on the findings, it is evident that development of the proposed project will greatly contribute towards safeguarding the health of artisanal and small-scale gold mines and the surrounding environment on the adverse health effects of mercury in the area. The study indicates that the potential negative impacts can be easily mitigated without any major effect to the environment and social components as the project will be implemented within the active PML licensed area in already modified environment and isolated from human settlements. Thus, the study concludes that a number of environmental and social impacts have been identified and assessed; none of these are considered to be that severe after mitigation as to prevent further planning, design and construction of the proposed development. The project development in the area can be considered suitable subject to the implementation of the mitigation measures as indicated in the Environmental and social management plan.

### Names of Environmental Experts Involved in the ESIA

S/N	Name of Consultant	Position/Area of Expertise	Signature
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2.	Mr. Bashiru Abdul Hassani (Reg No. NEMC/EIA/0034 )	Sociologist (Socio-economic expert)	
3	Mr. Sengerema Thomas (Reg No. EC/EE- EIA/2023/5924)	Natural Resources Management	
	<b>Other Experts</b>		
4	Mr. Alfred Pius Anthony	Occupational Health and Safety Specialist	

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### **ACKNOWLEDGEMENT**

This report was produced for the proposed Construction of Artisanal and Small-Scale Gold Mining (ASGM) Gold Ores Processing and Washing Facilities at Itumbi Village, Matundasi Ward in Chunya District, Mbeya Region, Tanzania. The report was written based mainly on field work and secondary data from various reports and documents cited in the report. The PIT would like to acknowledge all stakeholders for their valuable comments, information and data during the study, the Chunya - Regional Mines Office and Chunya - District Executive Director's office for providing officers to accompany Consultant during the field work and stakeholders' engagement at local level. The National Environment Management Council (NEMC) for screening the project.

## LIST OF ABBREVIATIONS AND ACRONYMS

AQS	Air Quality Standards
ASG	Artisanal and Small-Scale Gold
ASGM	Artisanal and Small-Scale Gold Mining
BAT/BEP	Best Available Techniques/ Best Environmental Practice
CBA	Cost-benefit analysis
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CDC	Chunya District Council
CMMVI	Chronic metallic mercury vapor intoxication
CRB	Contractors Registration Board
dBA	Decibels A
DWs	Disability weights
EHPMP	Environmental Health and Pollution Management Project
EIA	Environmental Impact Assessment
EM(SQS)	Environmental Management (Soil Quality Standard) Regulations, 2007
EM(WQS)	Environmental Management (Water Quality Standard) Regulations, 2007
EMA	Environmental Management Act
EMP	Environmental Monitoring Plan
EPA	Environmental Protection Agency
ERR	Economic Rate of Return
ESF	Environment and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plans
ESS	Environmental and Social Standards
FDI	Foreign Direct Investment
FEMATA	Federation of Mining Associations of Tanzania
FGD	Focused Group Discussion
FGM/C	Female genital mutilation/cutting
FYDP	Five-Year Development Plan
GBV	Gender-based violence
GCLA	Government Chemist Laboratory Authority
GDI	Gender Development Index
GDP	Gross Domestic Product
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gases
GIIP	Good International Industry Practice
GoT	Government of Tanzania
GRM	Grievance Redress Mechanism
GST	Geological Survey of Tanzania
HDRO	Human Development Report Office
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
HWCM	Hazardous Waste Control and Management
IFC	International Finance Corporation
ILO	International Labour Organization
LGA	Local Government Authority

LSM	Large-Scale Mining
M&E	Monitoring and evaluation
MBEREMA	Mbeya Regional Miners Association
MC	Mining Commission
NAG	N-acetyl- $\beta$ -glucosaminidase
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGOs	Non-Governmental Organization
NIHL	Noise-induced hearing loss
NPA-VAWC	National Plan of Action to End Violence Against Women and Children
NPV	Net Present Value
NSC	National Steering Committee
OHS	Occupational Health and Safety
OSH	Occupational Safety and Health
PAP	Project Affected People
PDF	Portable Document Format
PEP	Post-exposure prophylaxis
PHEDEA	Promoters of Health and Development Association
PIT	Project Implementation Team
PM	Particulate Matter
PML	Primary Mining License
PPEs	Personal Protective Equipment's
PVC	Polyvinyl Chloride
PWDs	Persons with disabilities
REMA	Mining commission and Regional Miners Association
RMOs	Resident Mines Offices
SAP	Super absorbent polymers
SEA	Sexual Exploitation and Abuse
SEP	Stakeholders Engagement Plan
SH	Sexual harassment
SHE	Safety Health and Environment
SQS	Soil Quality Standards
STDs	Sexually Transmitted Diseases
SWM	Solid waste management
TAC	Technical Advisory Committee
TANESCO	Tanzania Electric Supply Company Limited
TBS	Tanzania Bureau of Standards
TOR	Terms of Reference
TSP	Total suspended particles
TWA	Time-weighted average
TZS	Tanzania shillings
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
URT	United Republic of Tanzania
VAT	Value Added Tax
VEO	Village Executive Officer
WEEE	Waste electrical and electronic equipment
WEO	Ward Executive Officer
WHO	World Health Organization
WQS	Water Quality Standards

WSH  
WUGs  
YLD

Workplace Sexual Harassment  
Water User Groups  
Years Life with Disability

# 1.0 INTRODUCTION

## 1.1 PROJECT BACKGROUND

Artisanal and Small-Scale Gold Mining (ASGM) is a key contributor to livelihoods and mineral production in Tanzania; however, the widespread use of mercury in gold extraction presents significant risks to human health and the environment. To address these challenges, the Government of the United Republic of Tanzania, with financial support from the Global Environment Facility (GEF) through the World Bank, is implementing the Environmental Health and Pollution Management Project (EHPMP). The project is implemented by the National Environmental Management Council (NEMC), with the Mining Commission serving as the lead institution for the construction of Artisanal and Small-Scale Gold Mining (ASGM) Gold Ores Processing and Washing Facilities.

Under this arrangement, a facility is proposed to be constructed at Itumbi Village/Kitongoji, Matundasi Ward, Chunya District, Mbeya Region, Tanzania (Figure 1.1). The proposed project site is located at coordinates 08°21'34.00" South and 33°17'26.00" East and is one of seven (7) selected sites situated in regions with a high concentration of ASGM activities

The selection of the proposed site followed technical surveys and assessments conducted by a multidisciplinary team comprising representatives from the Ministry of Minerals, the Mining Commission (MC), the Geological Survey of Tanzania (GST), the relevant Local Government Authority (LGA), the Federation of Mining Associations of Tanzania (FEMATA), and NEMC. A number of existing ASGM sites were assessed to identify suitable locations for the establishment of gold ore processing and washing centres. Site selection was guided by criteria including the level of activity at the sites (number of miners, mining pits, washing bays, and Primary Mining Licences (PMLs)), production capacity, historical profiles of mining operations, and surface rights considerations such as land ownership status, existence of surface rights conflicts, and proximity to water bodies, residential areas, and protected areas.

Based on the site visits and technical analyses undertaken, the Itumbi ASGM site was found suitable for the establishment of the proposed facility. The mineral right for the project area is held by Mr. Vincent Bruno Minja under Primary Mining Licence PML0671MBY (Appendix 1), and surface rights have been secured through consent granted by the relevant local authority (Appendix 2). While NEMC remains the implementing agency of the EHPMP and the Mining Commission leads the construction of the facility, the mineral right holder will operate the facility upon completion and will be responsible for the day-to-day management of site operations and site-specific environmental issues in accordance with agreed terms and applicable regulatory requirements.

The project area is designated for mining activities, and no land use conflicts are anticipated. Mining operations at the site commenced in 2014 and are currently active, employing underground mining methods with approximately 48 mining pits. Current production is estimated at about 150 bags of ore per day, with more than 250 people involved in mining and processing activities within the mineral right area. Existing infrastructure includes 14 crushers and 11 washing and amalgamation areas. Gold extraction at the site involves mercury amalgamation alongside cyanidation through VAT leaching conducted within the licensed area.

The proposed facility will function as a demonstration centre for improved mercury management practices in ASGM operations. It will be equipped with appropriate Personal Protective Equipment (PPEs) and supporting infrastructure to facilitate training and practical demonstrations. Through these interventions, the project aims to reduce mercury exposure among miners and surrounding communities, minimize environmental contamination, and promote safer and more sustainable gold processing practices. Similar facilities will be established under the EHPMP in other ASGM-intensive regions, including Geita, Mwanza, Mara, Shinyanga, Singida, and Songwe.



**Figure 1.1: Administrative map showing Matundasi Ward and Chunya District**  
 Source: TRES Consult (T) Limited, 2023

The construction and operation of the proposed ASGM Gold Ores Processing and Washing Facilities are likely to have adverse environmental and social impacts that must be addressed prior to the implementation of the project. Also, the Environmental Management Act, Cap 191 and the Environmental Management (EIA and Audit) (Amendment) Regulations, 2018 requires that ESIA be undertaken for all new projects that may cause adverse environmental and social impacts. The First schedule of the Regulations categorized the Extractive Industry Projects such as small-scale mining and related activities as borderline projects (Type B1 category), which may or may not require ESIA study. Likewise, the World Bank's Environmental and Social Standards requires the borrower to identify, assess and manage potential environmental and social impacts associated with the project. In view of the above the NEMC (on behalf of Mr. Minja) commissioned Mr. Abel Noah Sikaona (registered environmental expert) of Dar es Salaam to undertake the ESIA in accordance with the above national environmental legal

requirements and World Bank Environment and Social Framework (ESF) and the project's Environmental and Social Management Framework (ESMF).

In fulfilment of the above, the formed team of Environmental and Social Experts undertook groundwork and prepared EIA application documents which included Scoping Report and Terms of Reference (TOR) as a first step in the environmental assessment process. The documents were submitted to the Council (NEMC) and the project was registered and allotted Project Reference No. EC/EIA/2024/9818 and a decision to prepare detailed project brief for the project was made (Appendix 5). The approval was communicated through a letter of 21/03/2024 with Reference Number HC.145/259/19/01 (Appendix 5). The Environmental Management Act, Cap 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF) were observed in the study.

## **1.2 PROJECT RATIONALE**

Tanzania has a surface area of 947,300-km<sup>2</sup> and it is endowed with a variety of minerals including Metallic minerals (Gold, Copper, Nickel, Cobalt, Manganese etc.); Gemstones (Tanzanite, Ruby, Sapphire, Garnets etc.); Energy Minerals (Coal, Uranium etc.); Industrial Minerals (Gypsum, Limestone, Kaolin, Graphite etc.); and Building materials. 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 of 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 the Artisanal and Small-Scale Mining 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. Recent Government initiatives on formalization of the ASM the subsector has contributed significantly to Tanzania's gross domestic product (GDP), making this activity an important source of employment and income for miners and their dependents.

The ASGM use mercury in gold recovery but the entire process is dangerous to human health and the environment because amalgamation is done by bare hands and the amalgam is heated in open air to drive away the mercury. Available literatures indicate 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. In response to threats that Mercury poses to human health and environment, the Government has signed a Grant Agreement with World Bank, as an implementing agent, the Global Environment Facility (GEF) to finance. The EHPMP. The project aims to strengthen the institutional capacity to manage and regulate mercury use in the Artisanal and Small-scale Gold Mining and to introduce alternative technologies to mercury for gold recovery in ASGM subsector. Establishment of demonstration centers for Gold Ores Processing and Washing Facilities is one of the ways to manage and regulate mercury use in the Artisanal and Small-scale Gold Mining to partly address the mercury associated health and environmental impacts to miners and surrounding communities as noted.

## **1.3 OBJECTIVES OF THE STUDY**

The overall objective of carrying out this study was to identify, predict and assess both positive and negative environmental and social impacts associated with the proposed Construction of Artisanal and Small-Scale Gold Mining (ASGM) Gold Ores Processing and Washing Facilities at Itumbi Village, Matundasi Ward in Chunya District, Mbeya and propose mitigation measures to minimize the negative impacts and enhance the positive ones. The assessment used data and information on the physical, biological, and socio-economic environment to predict both negative and positive impacts of the project.

The design provides mitigation measures of the adverse impacts and plan the monitoring of potential changes that may arise in the course of implementing the project.

## **1.4 METHODOLOGY OF THE STUDY**

The study applied different participatory methods to involve all the concerned stakeholders. The methodology used in this study is commensurate with the Environmental Management Act, Cap 191 and the Environment Impact Assessment and Audit (Amendment) Regulations, 2018). The study was undertaken based on checklists complimented by past experience of the Consultants and through discussion with Project Implementation Team, Mining commission, local government officials and communities in the vicinity of the project site.

The study was done both as a desktop study and field work. It involved review of literature/documents including Environmental and Social Management Framework (ESMF) report, EHPMP project background reports, socio-economic as well as investment profiles, and field studies at the project site to gather information and data on various aspects of the project. The environmental assessment required consultations with a number of stakeholders including responsible government agencies, NGOs and local authorities in Chunya District and Mbeya Region.

A multi-disciplinary team of experienced scientists, environmental and social professionals was assembled to carry out the required resource assessment, generation of baseline data, determination of potential impacts and recommendation of mitigation measures. An interactive approach was adopted among the environmental team members and other project professionals.

The team utilized the checklist for data gathering, analysis, and presentation whereby team members conducted the reconnaissance investigations together to determine the critical elements for analysis and the issues to be highlighted for the design and planning process. Team meetings were held to discuss the progress of investigations and analyses that facilitated integration of data towards an understanding of the systems at work in both the natural and built environment. Baseline data for the study area was collected using a combination of:

- Site Reconnaissance
- Analysis of Maps and Plans
- Review of Reports and background documents
- Checklists
- Field Studies
- Public Consultations

### **1.4.1 Communication with Stakeholders**

#### *Identification of stakeholders*

The stakeholders were identified based on their roles, relevance, and potential to be impacted or to impact the project. Most of the stakeholders that might be impacted by the project e.g., the nearby local government authorities, Government Departments, Parastatal Organization and the National Environmental Management Council, Mining commission and Regional Miners Association (REMA) were pre-determined, while others were identified by different stakeholders including the PIT. Some of the stakeholders unfolded as consultations went along, e.g., groups and individuals on and in the vicinity of the project area.

### *Involvement of stakeholders*

The study team in collaboration with regional mining commission office and district environmental officer visited the proposed project area, neighboring community. Physical observations and stakeholder's interviews were conducted in order to collect baseline data and issues of concerns. The scoping study applied different participatory methods to involve all relevant stakeholders. The consultant ensured that all the concerned parties were given adequate opportunity to participate in the scoping exercise. One-to-one interviews with individuals, based upon a list of general topics or questions and partly based on an open discussion, were conducted. Focused group discussions with individual stakeholder or representative of an organization, vulnerable groups and project affected people were also used to gather information.

In establishing the views of the public concerning the proposed project, the consultants provided introduction letter addressed to each stakeholder briefing the project, need for ESIA and asking the stakeholder to freely raise their concerns to the Consultant. Public notices were posted on strategic places requesting stakeholders who did have opportunity to raise their concerns to do so through written or verbal communications.

### *Identification of stakeholders' concerns*

Through interviews, discussions and other communication channels the stakeholders pointed out issues and concerns. An issue raised by one individual or a group of people was cross-checked by discussing it over with other groups (triangulation). Stakeholders' views were also sought on their acceptance or supportiveness of the project in the area. Key issues raised by each stakeholder group were summarized in this report. Details of stakeholders consulted, record of main issues raised, names and signatures of people consulted are presented in Chapter 5 and in appendix 3 of this report.

## **1.4.2 Physical Environment**

Information was gathered on the existing physical environment, particularly as related to geology, topography, soils, drainage, water quality, air quality and noise.

### ***Geology, Topography, Soils***

Information on the climate, geology, topography, soils, was obtained by compiling data from literatures of the areas. Aerial photos, satellite imagery maps and other published reports were also examined. Field work was carried out to augment and verify existing information relating to geology and soils and to obtain first-hand knowledge of the area.

### ***Hydrology and drainage***

Surface and ground water characteristics were assessed using field investigation, maps and data from previous reports. Field investigation was carried out to determine and verify all the existing inflows into the general area, including both natural and man-made features, assessment of drainage issues, sediments transfer and its impact to the project. This also included interviews with local community members, and discussions with stakeholders.

## **1.4.3 Biological Environment**

This study surveyed the proposed project site including the surrounding areas to reveal the existing environmental conditions including determination of habitat types as well as revealing the flora and fauna found in the project area. This study involved literature reviews, Google earth satellite image (GE) analysis, and field investigations.

### **Flora**

The vegetative communities were identified and classified into community types. Identification was carried out of dominant tree species. The vegetation was identified and described for their property.

### **Fauna**

The proposed project area was surveyed using methodology outlined in the African Forest Biodiversity (Leon *et al.*, 2002). Interviews with the locals to get information on commonly sighted animals in the area and if there exists any migration corridor was also employed. Observations were made to determine presence of animal signs such as droppings, burrows and/or footprint in the project area. Small mammals, amphibians and reptiles were studied through sighting, droppings whereas, birds and insects were identified through sighting, droppings, burrows, and visualization.

#### **1.4.4 Specialized Baseline Surveys**

Field measurements were done by NEMC team to determine baseline conditions of some parameters. Water and soil samples were collected from the proposed project site for laboratory analysis in Dar es Salaam. Sample preservation methods were used to ensure samples are not degraded during transportation to the Laboratory. Spot measurements were also done for ambient air condition (particulate matter) and ambient noise levels.

#### **1.4.5 Socio-economic Environment**

To determine the cultural and social factors associated with the construction and operation of the proposed project, members of the communities in the general vicinity of the project were interviewed and a review of economic and social literature was conducted. Further, rapid field appraisal techniques in conjunction with desk research were employed to investigations of the socio-economic considerations within the project area. These were undertaken to ascertain information to satisfy the following factors as outlined in the approved terms of reference provided:

- i) Population and settlement characteristics
- ii) Land uses and livelihoods
- iii) Community structure, employment and income
- iv) Developments underway
- v) Infrastructure in place
- vi) Water supply and other utilities
- vii) Waste management practices
- viii) Recreational activities
- ix) Energy supply
- x) Public health and safety
- xi) Access to and delivery of health, education and social services
- xii) Project awareness and acceptance

#### **1.4.6 Policy, Legal and Institutional Arrangement**

Policy, legal and institutional arrangement were compiled from review of documents: policies, legislation, guidelines and standards. Information and data on local by-laws, institutional structures and mandates/authority were obtained from Chunya District Council and local government Council and relevant committees.

## 1.5 REPORT STRUCTURE

This report is organized in twelve chapters. Chapter 1 gives a general background of the project; Chapter 2 deals with the project description; Chapter 3 gives a description of pertinent policy and legal framework within which the project will operate and Chapter 4 presents the environmental, socio-economic and cultural setting of the project site. Chapter 5 is stakeholder's analysis, Chapter 6 present impacts identification, Chapter 7 gives the mitigation measures Chapter 8 is the environmental management plan in Chapter 9 is the Monitoring Plan while Chapter 10 is Cost Benefit Analysis, Chapter 11 is decommissioning plan and finally Chapter 12 presents summary and conclusion.

## 2.0 PROJECT DESCRIPTION

### 2.1 SITE SELECTION

The selection of ASGM was based on the activeness of the sites (number of miners, 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). Surface-right issues were clarified as a screening criterion for an area to be considered for the Project. Some of the critical issues considered include: the sites being free of conflict; PML owners or surface right owners' consent to provide land for the Project without compensation; and the site being 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). Based on the analysis made in the ASGM sites visited in the Mbeya region, the site of Mr. Vicent Bruno Minja (PML0671MBY) was selected for the Construction of Artisanal and Small-Scale Gold Mining (ASGM) Gold Ores Processing and Washing Facilities.

### 2.2 PROJECT LOCATION AND ACCESSIBILITY

Administratively the proposed project site will be located at Itumbi Milimani area, Itumbi Kitongoji, Matundasi Ward, Chunya District, Mbeya Region, Tanzania. The site is located about 34.5 Kms from Chunya District Headquarter via Matundasi centre. Matundasi is about 21 Kilometers from Chunya CBD along the tarmac Chunya – Makongorosi Road and the site is about 13.5 Kilometers from Matundasi on Northern side. The site is also about 4 kilometers on the west north of the Itumbi Village centre. The coordinates of the site are S 08°21'34.00" E 33°17'26.00"). The site is accessible through earth road.

### 2.3 SITE DESCRIPTION

The earmarked project site (4900 sqm) is characterized with a number of abandoned mining pits from previous mining activities (see plate 2.2 below). However, the mining activities did not affect much the vegetation cover of the area as still the area has mature tree species and bushes and disturbed grasses. The vegetation of the area is miombo woodland like most part of the Chunya Districts. It is well preserved compared to other areas of mining activities within the district and the common species include *Branchystigea*, *Dalbergia*, *Pteracarpus*. The dominant species at site include *Brachystegia spiciformis*, *Brachystegia boehmii*, and *Julbernardia globiflora*. See plate 2.1 below. The soils of the area are light brownish to yellowish clay soils while on the lower areas of the area features greyish to black clay soils. The topography of the project site is flat inclined towards the eastern side. Thus, the overland flows towards the eastern side on the plains which act as depository. Further to the east about 4 kilometers is a small tributary of Lupa River. Lupa River is about 6.5 kilometers from the side towards the same

direction, it flows toward Songwe River that drains into Lake Rukwa. Thus, hydrologically the area falls under Lake Rukwa Basin.

As noted earlier the earmarked project site is within the Mining license with active mining activities. Underground mining is undertaken through established pit in which there are 48 mining pits as well as central area with facility for gold ore washing and processing (see plate 2.3 below). There are 14 crushers, 11 washing area and amalgamation area where mercury is used. More than 250 people are involved in the mining and processing activities within the license area. Also, cyanidation using VAT Leaching as another alternative method for processing gold ore within the mineral right is used. The site operations started in 2014 and current is producing about 150 bags per day. The earmarked proposed site is approximately 60 meters to the central area on the eastern side. Also, there is an office area further to the west north about 80 meters of the site.



**Plate 2.1: Features of the project site**

Source: Field visit, September 2023



**Plate 2.2: Features of the project site**

Source: Field visit, September 2023



**Plate 2.3: Crasher area**

Source: Field visit, September 2023

## 2.4 ADJACENT FEATURES

The area of the licensed area is surrounded also by small scale mining activities with numerous pits for underground mining and central area for washing and processing gold ores (see google map on figure 2.2 below). The community centre is relatively far from the project site which is Itumbi village centre located about 4 kilometers to the eastern side. The structures shown on plate 2.2 below around the project site are also mining related structures for other miners.



Figure 2.2: Google Map showing the adjacent features

## 2.5 LAND ACQUISITION AND OWNERSHIP

The mineral right of the area is owned by Mr. Vicent Bruno Minja through Primary Mining License (PML) PML0671MBY (Appendix 1). The surface right consent from the local authority was provided to Mr. Vicent Bruno Minja for the Mining related activities (Appendix 2). The area is designated for mining activities and thus there is no land use conflict. The mineral right owner is responsible for mining activities within his licensed area, including hiring and paying for labour, organizing the mining, and adhering to safety and environmental regulations. The PML holder is also responsible for managing the sites' production and safety issues. The land required for this project is 4,900 square meters (70m x 70m).

## 2.6 PROJECT COMPONENTS

This facility is designed for processing 1-2 tons of ore per hour (tph), suitable for small scale ASGM operations. The flow involves size reduction, gravity separation, washing, amalgamation, and safe handling of hazardous materials like mercury

### i. Crushers

These robust machines form the first critical step in the processing chain. Their function is to break down large, raw ore into smaller, manageable fragments, liberating gold particles from the surrounding rock for subsequent recovery. In this specific facility they are operated at a feed rate to consistently supply the downstream system, which is designed for a steady 1 to 2 tons per hour.

### ii. Sluicing Box

Acting as the primary gravity concentration unit, the sluice is where the first major separation of gold from waste material occurs. Crushed ore mixed with water is channelled down this 3-meter-long, 0.4-meter-wide inclined plane. Set at a slope of 10 to 15 degrees, the flow velocity is calibrated so that dense gold particles settle and are trapped behind riffles, while lighter gangue material washes away. Its dimensions are precisely engineered for the plant's target capacity of 1 to 2 tons of ore per hour.

### **iii. Washing Bay & Settling Pond**

This large, concrete basin serves a dual purpose. Primarily, it acts as a secondary washing and manual concentration area for material from the sluice. Equally important is its role as a settling pond, where the fine silts and particles suspended in the wastewater are given time to settle out before the water is reused or released. Measuring 7.5 meters long by 2.5 meters wide and 1.2 meters deep, its substantial volume is necessary to handle the slurry and effluent generated from processing 1 to 2 tons of ore hourly.

### **iv. Collection Water Pond**

Located to capture overflow from the washing bay, this pond is the facility's water recycling hub. It stores clarified water after the majority of solids have settled out, allowing this vital resource to be pumped back into the process circuit. This conservation measure is essential for sustainable operation. At 3.88 meters long, 2.35 meters wide, and 1.2 meters deep, its capacity is scaled to manage the hydrological balance of the 1 to 2 tons-per-hour operation.

### **v. Panning and Amalgamation Pool**

This dedicated two-compartment pool is where the concentrated material from the sluice undergoes final upgrading and the hazardous process of mercury amalgamation. The first, deeper compartment (900mm) is used for careful planning to produce a high-grade concentrate. The second, shallower compartment (700mm) is specifically for introducing liquid mercury, which binds with the fine gold to form an amalgam paste. Each compartment measures 2.5 by 2 meters, providing a confined, controlled workspace for these critical and delicate tasks.

### **vi. Amalgam Burning Chamber/Room**

This specially designed enclosure is for the high-risk process of separating gold from the mercury-amalgam. Inside this 3.35 by 2.675 meter room, the amalgam is heated, causing the mercury to vaporize and leaving behind crude gold. The chamber's design prioritizes operator safety and pollution control through forced ventilation or fume capture systems to prevent the release of toxic mercury vapor, processing an estimated 1 to 2 kilograms of amalgam per batch.

### **vii. Water Storage Tank**

This tank is the plant's primary clean water reserve, ensuring a reliable and consistent supply for all washing and processing stages independent of immediate external sources. With a holding capacity of 3,000 liters, it acts as a buffer and supply for the continuous operation, directly supporting the processing of 1 to 2 tons of ore each hour.

### **viii. Water Pump**

The circulatory system of the facility, this pump is responsible for moving water throughout the plant. Its key specification is an 8-meter head, meaning it has sufficient power to lift water from the collection pond to the highest point of the sluice or crusher feed, overcoming elevation differences within the plant's layout to maintain the necessary flow and pressure for efficient operation.

### **ix. Mercury-Contaminated Tailings Storage Area**

This secure containment area is a critical environmental control and intermediary storage feature. All waste sands and sledges that have come into contact with mercury primarily from the amalgamation pool, are collected and stored here to prevent immediate environmental contamination. Measuring 3.6 by 3 meters and featuring drainage channels, it is designed to be impermeable, safely containing the hazardous tailings produced from the amalgamation process. **In the long-term operational plan, these stabilized tailings are scheduled for transfer to Carbon-in-Pulp (CIP) plants for residual gold recovery, with the final, inert waste destined for secure, engineered Tailing Storage Facilities (TSFs) associated with the CIPs operation, ensuring ultimate environmental safety**

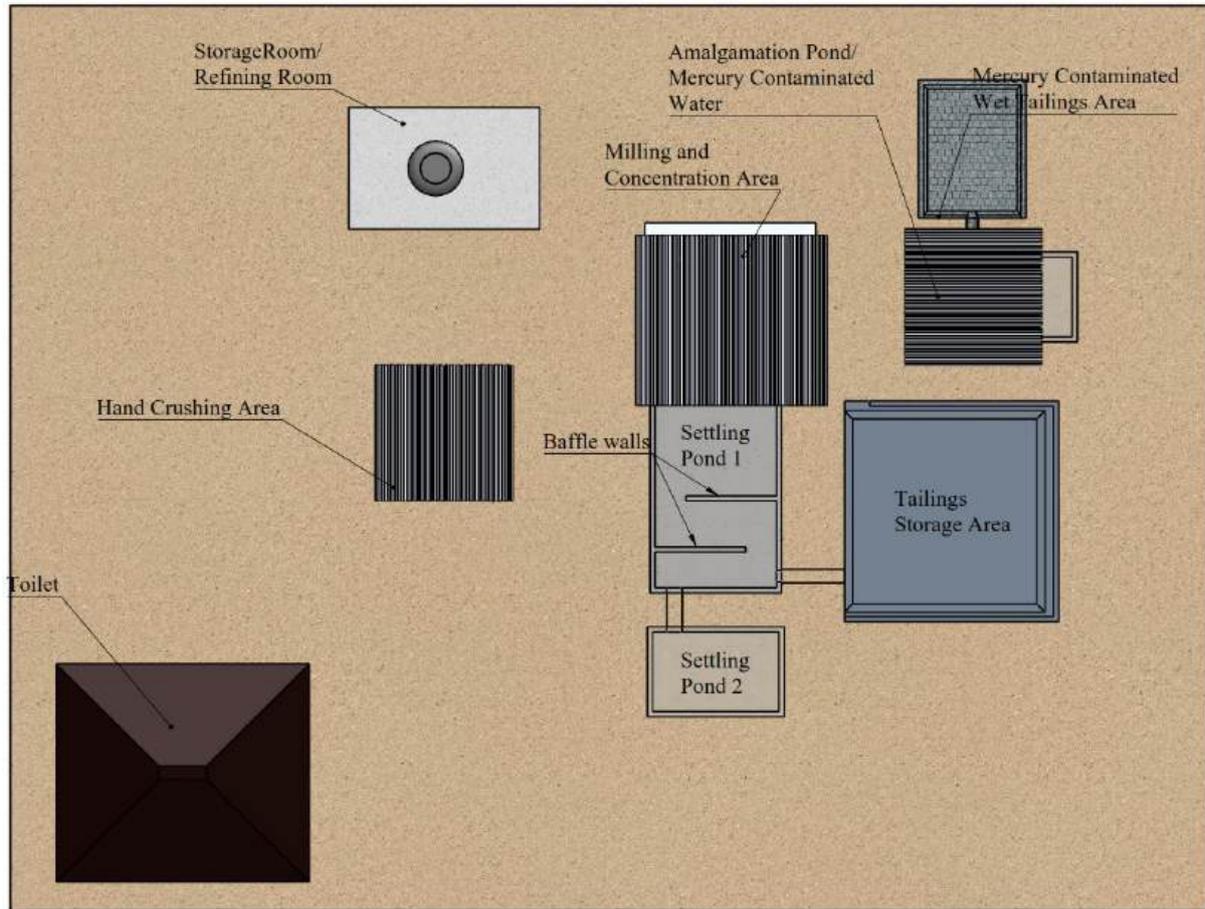
A summary of the components is as indicated in table 2.1 below

**Table 2.1: Project facility and capacity**

Component	Function	Size / Specifications	Capacity / Throughput
Crushers	To break down large ore into smaller fragments, liberating gold particles for recovery.	Industrial scale unit	Rated 1–2 tph
Sluicing Box	Primary gravity concentration; separates gold from waste using flowing water over an inclined plane.	3 m long × 0.4 m wide, slope: 10–15 degrees	Designed for 1–2 tons of ore per hour.
Washing Bay & Settling Pond	Dual-purpose: secondary washing/manual concentration and sedimentation of fine particles from wastewater.	7,500 mm × 2,500 mm × 1,200 mm (L × W × D)	Handles slurry from 1–2 tph ore processing.
Collection Water Pond	Stores clarified water from settling pond for recycling within the system.	3,880 mm × 2,350 mm × 1,200 mm (L × W × D)	Manages water flow for 1–2 tph operations.
Panning & Amalgamation Pool	Final concentration via panning and mercury-based amalgamation in a controlled environment.	Two compartments: each 2,500 mm × 2,000 mm; depths: 900 mm & 700 mm	Processes concentrates from 1–2 tph ore feed.
Amalgam Burning Chamber	Safely vaporizes mercury from the gold-amalgam using heat; includes ventilation/fume control.	3,350 mm × 2,675 mm; ventilated design	Estimated 1–2 kg of amalgam per hour.

Component	Function	Size / Specifications	Capacity / Throughput
Water Storage Tank	Holds clean water supply for entire washing and processing circuit.	Capacity: 3,000 liters	Supports continuous 1–2 tph operation.
Water Pump	Circulates water from collection pond or tank to crusher and sluice inlet.	Pump head: 8 meters	Maintains flow and pressure for 1–2 tph feed.
Mercury-Contaminated Tailings Storage	Secure containment for tailings with residual mercury; prevents soil/water contamination.	3,600 mm × 3,000 mm; includes drainage channels	

The site layout plan and individual components drawings and dimension is attached as appendix 5 and 6 to this document while figure 2.4 below is 3-Dimension Site Layout Plan.





**Figure 2.3: Site Layout Plan (3D)**

## **2.7 PROJECT DEVELOPMENT ACTIVITIES**

The project activities will involve various phases. Some phases are quite short lived and small in scale compared to other phases. The project will involve site preparation, mobilization phase, construction phase, operation phase as well as decommissioning phase which in common is not expected/thought of as the project is just about to take off. Below is the description of the mentioned phases.

### **2.7.1 Site preparation phase**

As noted earlier on site there are a number of abandoned mine pits that will require to be filled and the site levelled for the project. Ground clearing will only be undertaken where it is absolutely imperative to do so, for example to physically accommodate a particular structure, certain trees/bushes will have to be removed. Most of the clearing would be done manually as the proposed site is relatively small in size. Mechanical clearing, if employed, would be done with a tractor-mounted blade and not by means of a tracked bulldozer that will severely disturb the loose soil.

### **2.7.2 Mobilization phase**

The mobilization for basic structures will mainly involve deployment of required construction tools and machinery for the work and recruitment of the construction crew for the work. The phase will involve deployment of material and their transportations from the point sources to site. The phase will also involve setting up the temporary campsite for the storage of materials and construction equipment and machinery. The construction crew will be residing in the nearby areas and shuttling to and from the construction site. A Contractor will be responsible for this phase with supervision from the proponent/project management.

### 2.7.3 Construction / Installation Phase

General design and construction practices will be the same as those associated with almost any civil works project. Construction works will involve stripping of top soil, setting of foundations, excavations/digging for foundations, pouring of concrete and preparations of slab foundations, erection of steel pillars or bricks, fence etc. Once earth works and structure election are done then mechanical and electrical works will follow. Landscaping of the area and paving some of the activity work areas will be among of the final activities of the construction phase. Other works will involve;

- Installation of fittings such as doors, windows, glassware etc.
- Installation of electrical fittings such as lighting, fans, air conditioners etc.
- Installation of equipment and machinery such as pollution abashment facilities
- Installation of storage water tanks
- Landscaping and parking lots, drainages etc.
- Construction of waste water treatment facilities/tailing facilities
- Water supply piping and water storage tanks
- Construction of toilets

The project will use locally available construction materials. The construction materials such as sand, stone, and gravel are expected to be obtained from authorized areas. Industrial construction materials such as cement, pipes, poles, electrical cables, sanitary ware, and steel mostly will be procured from various shops in Chunya town. The contractor will be responsible for transportation of all construction materials and equipment from point source to the site mainly by using the existing roads. Most of the construction material such as cement, steel, wood, sand, stones and aggregates etc. will be brought from places far away from the project site.

All construction activities at the site will be carried out by a registered contractor. Machines and labour for manual works will be involved in the construction. The size of the workforce will dependent on the approach to construction taken by the contractor in terms of work schedule, quality of the work that is needed, the budget for the workforce and safety issues. However, it is estimated about 20 people will be involved with construction activities. Some labour forces will be recruited from local communities – especially for simple and manual operations that could easily be accomplished using local skills. Work crews may generally consist of a supervisor, operators and unskilled laborers. All the construction buildings and infrastructure such as site offices, stores and sheds will be of a temporary/prefabricated nature and will be dismantled and removed after completion of the project. **It is estimated that the construction time will be two (2) weeks.**

### 2.7.4 Demobilization Sub-Phase

After the construction work is done demobilisation will be required and especially to the cleared and excavated areas as well as removal of temporary structures for construction purpose. The demobilization will entail: - Reinstatement of the excavated area(s); Removal of any remaining construction materials; Use of spoils to reinstate the excavated areas; Removal of spoiled material from the site to avoid the movement of soil and sediment; Clearing of stock yard; Transportation of construction equipment, machineries and useful items offsite which will no longer be needed at site; and Security and safety measures.

### 2.7.5 Operation phase

### 2.7.5.1 Operation and monitoring of the facilities

Before starting operation, the building and structures will be inspected and approved by NEMC and Mining Commission particularly the Project Implementation Team (PIT). Demonstration centers will be under the control of PML owners and monitored by the RMO's. The project implementation team in collaboration with RMO's, PML owners and chairperson of REMA's will prepare guidelines and procedures of using the facilities to demonstrate safe use and handling of mercury to ASG miners. Operation cost of the facility will be determined and covered by the PML owner through the fees that will be charged thereafter. Register of trained miners will be kept every day. Security person will be hired to take care of the facilities.

### 2.7.5.2 Tools and PPEs for demonstration on safe use and handling of mercury

The activity will involve procurement of tools and PPE's which are required to demonstrate safe handling and use of mercury. The implementation team will give guidance in procurement of tools and PPEs for demonstration of safe handling of mercury in selected seven regions. The tools and PPEs to demonstrate the safe use and handling of mercury are as per table 2.2 below; -

**Table 2.2: Number of tools /PPEs at the demonstration center**

No.	Tools/PPES	Tools PPEs
1	Retort Stand	5
2	amalgamation pan	5
3	Spade	5
4	Gloves (in pairs)	100
5	Rain boot (in pairs)	50
6	Full face mask	50
7	Sisal Cloth (4M x 0. 5M) to capture gold concentrate during sluicing	20

### 2.7.5.3 Demonstration on Safe Use and Handling of Mercury

This activity will involve showing the artisanal miners on using the processing facilities after being constructed. The demonstration will focus on safe uses and handling of mercury and will be carried in all selected seven regions to each constructed demonstration centre including this Itumbi centre. The implementation team will lead demonstration process regarding the safe use and handling of mercury to ASG miners for all constructed demonstration centres. Demonstration will be conducted under supervision of Project Implementation Team, Resident Mine Officer, Chairperson of Regional Miners Association and PML owner. In each demonstration centers it is expected to train at least 5,000 small scale miners per year.

The actual gold ore processing will involve receiving the raw gold ores at the designated area that will be an open shed area from ASG mine pit. The raw gold ores will then be sent to jaw crusher to reduce size into small particles. The crushed ores will be sent to sluicing table where sisal cloth is used to capture gold ore particles against other particles. Other particles are removed as residual which are also termed as uncontaminated tailings. Captured gold ore particles are further sent to the washing bay where mercury is introduced to capture gold. The process called panning is done under this stage where gold amalgam increases the size as mercury captures gold in the pan.

Once there is no further increase of gold amalgam size in the pan (symboling no significant gold is in the pan) then the amalgam is sent to the cloth to squeeze to release mercury for another round of panning. The remaining materials are removed in the process and are termed as contaminated tailings which are stored at the tailing storage area/facility. The squeezed remains are the raw gold that will be sent to retort stand (direct smelting) to recover both gold concentrate and mercury. Mercury is returned back in the panning process while the gold concentrate is the main product of the entire process that is sold by the ASGM. This process is further illustrated in appendix 8 with Site Layout Plan and other project drawings in appendix 9.

The mercury contaminated tailings storage area allows remaining water with mercury to seep into drainage that leads to the settling ponds. The water contaminated with mercury in settling pond is reused back into the system in close loop manner. The tailing storage facility is a temporary storage area for the tailings before taken for advanced gold recovery methods either within the PML owner or sold elsewhere. The advanced gold recovery methods/technology are fully authorized with NEMC after undertaking thorough ESIA study with ESIA report in place on how to manage the resultant remaining materials. Thus, the storage of mercury contaminated tailings at site has been designed considering the generation rate of the tailings at the site. Thus, at any one time the material will be not be larger than the storage facility. Full design of the storage facility is provided under appendix 8 and 9.

## **2.8 UTILITIES AND AUXILIARY SERVICES**

### **2.8.1 Water supply**

Water will be mainly used during the construction phase in concrete preparation, and domestic uses by the workers on site. During operation, the facility will require water for process activities and for domestic use. Currently it is sourced from the borehole for domestic usage and from mining pits for gold ore processing. Source of water for the project will be looked at if existing borehole discharge capacity suffice project need or not. If capacity will suffice then the same will be used and if not will explore to have another new borehole with sufficient water supply. Water storage tanks with a capacity of 3,000 litres will be installed to ensure steady supply of water for gold ore processing

### **2.8.2 Power requirement**

Power supply to the project site is provided by TANESCO through a dedicated overhead 11 kV line feeding into the main transformer via a 630-ampere main circuit breaker. A new dedicated transformer has been installed for the project, complete with a transformer yard constructed as required. The transformer steps down the incoming supply to serve the project's medium-voltage (MV) reticulation system. All MV switchgear has been designed for a fault level of 50 kA, and each circuit breaker is fitted with an earthing switch. The main substation and associated electrical equipment are adequately maintained and are in good working condition.

The project is already connected to the on-site main transformer. During the operational phase, electricity consumption will primarily be associated with crushers, with additional limited demand for offices, lighting, and auxiliary tools. Lighting systems will operate at low voltage and comprise general lighting and spotlight fittings integrated into the ceilings. All applicable guidelines and precautionary measures relating to electrical installations and usage will be strictly observed throughout the project lifecycle.

### **2.8.3 Solid waste**

People on site during construction will be supplied with food and water and thus wastes like food remains, used water bottles and paper wastes are inevitable. It is estimated that about 2 to 5 kg of domestic solid waste will be generated per day. Construction waste also will consist of left over concrete, packaging materials and spoil material. Excavated soil will be used to backfill the trench after pipe laying. Biodegradable wastes will be buried in a pit to be established while non degradable wastes like plastic bottles, tins, cans and grass bottles/materials will be stored in a controlled room for handling over to the companies that recycles /reuses the materials.

During operations, the project activities at ASGM facilities will also generate solid wastes. The project will provide waste collection bins and placed in all areas generating wastes for collection at source. Likewise, there will be different type of waste bins according to the nature of waste to facilitate sorting at source. The same waste management practice as noted above will be adopted to include having controlled pit for biodegradable wastes and waste storage rooms for collection of non-degradable wastes like plastic bottles, tins, cans and grasses bottles/materials. Recyclables will be sold to the collectors of such items in the area.

### **2.8.4 Liquid waste management**

The wastewater to be generated at ASGM facility will be from processing and non-processing wastewater. Non-process wastewater will be generated from cleansing operations, toilets, wash rooms etc. Wastewater from domestic will be treated in the septic tanks and soak away pits to be constructed at the project area. There will be no waste water to be left to disperse to the open environment. Process water with mercury contamination will be directed to the settling ponds and reused back into the system for processing in a close loop manner.

### **2.8.5 Drainage system at site**

The core facility area will be concrete surfaced with storm water drainage leading to the collection pond. The storm water from this pond will be pumped directly to the Sluicing Box for usage at the Sluicing Table. This measure will temporarily reduce amount water for processing from the borehole source or mining pits. Further, the measure will ensure potentially mercury contaminated water from the core operations are not directed to the open environment rather are being used in the processing at site

### **2.8.6 Health and safety aspects**

The project siting was performed according to international best-practice and guided by minimizing the possible negative impacts on the project's surroundings: the safety of neighboring areas from possible emissions. The safety philosophy comprises the following elements: inherently safe process design, strategically, placed instrumentation; operator training/testing; physical and mechanical safety devices, and emergency systems. Contractors as well as employees will need to have basic training regarding safety performance standards. Critical process systems, emergency systems, monitoring and emergency power systems will be incorporated into the project design to make the process inherently safe.

Safety gears (PPEs) will be provided to workers and enforcement of use will be strict. An emergency response plan will be in place to elaborate on what items to be checked regularly. All workers will undergo fire emergency drills and will be trained on how to use fire-fighting equipment in case of fire incident. Further, the entire facility will be enclosed by wire fenced with entry and exit gate for public safety and security reasons.

## **2.9 THE PROJECT INVESTMENT COSTS**

The total project investment cost is estimated to be TZS. 62,175,683.83 equivalent to US Dollar 24,489.80.

## **3.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK**

### **3.1 INTRODUCTION**

In developing the Artisanal and Small-Scale Gold Mining (ASGM) Gold Ores Processing and Washing Facility in the area, various environmental and social issues may arise at any phase of the project development i.e., from site selection, mobilization to decommissioning phases. These issues need to be addressed so that the envisaged operations do not impair the integrity of the environment and ensure that they are in line with policies and legal regime operating in Tanzania as well as World Bank safeguards policies. This chapter list down relevant policies and legislations pertaining to the planning and implementation of the proposed project; -

### **3.2 RELEVANT POLICIES**

The following are relevant sectoral and cross-sectoral policies which provide directives on how the project should be operated in relation to concerned environmental and socio-economic settings. The proponent will need to observe these policies in the course of designing and implementing the proposed project activities.

#### **3.2.1 The National Environmental Policy, 2021**

The National Environmental Policy (NEP) sets broad goals committing Tanzania to sustainable development of its natural resources. This policy serves as a national framework for planning and sustainable management of the environment in a coordinated, holistic and adaptive approach taking into consideration the prevailing and emerging environmental challenges and national and international development issues. The effective implementation of this policy requires mainstreaming environmental issues at all levels, strengthening institutional governance and public participation in the environmental management regime. The long-term vision of this policy is geared towards the realization of environmental integrity, assurance of food security, poverty alleviation and increased contribution of the environmental resources to the national economy. The key objectives of the policy are to:

- Enhance environmentally sound management of land resource for socio-economic development.
- Promote environmental management of water sources.
- Strengthen conservation of wildlife habitats and biodiversity.
- Enhance conservation of aquatic system for sustained ecological services and socioeconomic wellbeing.
- Enhance conservation of forest ecosystems for sustainable provision of environmental goods and services.
- Manage pollution for safe and a healthy environment.
- Strengthen the national capacity for addressing climate change impacts.
- Ensure safety at all levels of the application of modern biotechnology.
- Promote good governance in environmental management at all levels.
- Enhance predictable, accessible, adequate and sustainable financial resources for environmental management and promote gender consideration in environmental management.

The policy advocates using other relevant approaches in environmental management such as economic instruments, environmental standards, indicators and legislation. In carrying out this study for project, the project proponent has observed important requirement of the policy and will observe other provisions of the policy.

### **3.2.2 The Mineral Policy of Tanzania (2009)**

The policy insists that the environmental problems can arise from large as well as medium and small-scale mining operations. In general, mining activities can cause land degradation, air pollution and water contamination. The Mineral Policy of Tanzania, 2009 aims at strengthening integration of the mineral sector with other sectors of the economy; improving economic environment for investment; maximizing benefits from mining; improving the legal environment; and strengthening environmental management. The key objectives of the Policy are to:

- Continue attracting private investments in exploration and mining.
- Enhance Government participation in strategic projects in the mining sector.
- Emphasize the integration of the mineral sector with other sectors of the economy.
- Establish a fiscal regime that balances benefits with investments competitiveness.
- Support mineral beneficiation and marketing.
- Underpin development of small-scale miners.
- Promote public participation in mining activities.
- Guide investors towards sustainable exploitation of mineral resources of Tanzania in a win-win manner.

With regard to mineral processing, the policy has provided for guidance which aims at making sure that all interests associated with the environment, land, water and social economy of the surrounding community are observed during the Gold Ores Processing and Washing Facilities process. The policy has specific strategies for environmental management by all mining related activities and those for ensuring human health and safety in mining. At the sectoral level, this policy guides all mining activities and hence its relevance to this project.

### **3.2.3 The Land Policy (1995)**

The National Land Policy of 1995 (revised in 1997) states that, “the overall aim of a National Land Policy is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources, and to facilitate broad – based social and economic development without upsetting or endangering the ecological balance of the environment”. Also, the Policy promote resource sharing and multiple land use techniques in area of conflicting land use, and lastly advocates the involvement of community in resource management, land use and conflict resolution. Although ASGM gold ores processing and washing facilities project is not located close to any settlements, the land surrounding the license area is located for mining activities and managed through the provisions of the National Land Policy. It is therefore imperative that the project operations shall be aware of the National Land Policy requirements for protection of land resources.

### **3.2.4 The Water Policy (2002)**

The main objective of this revised policy is to develop a comprehensive framework for sustainable development and management of the Nation’s water resources, in which an adequate legal and institutional framework for its implementation will be put in place. This framework promotes the optimal, sustainable and equitable development and use of water resources for the benefit of all Tanzanians, based on a clear set of guiding principles. The policy provides for beneficiaries' participation in water supply schemes. It addresses cross-sectoral interests in water, watershed management and integrated and participatory approaches for water resources planning, development and management. The policy provides a shift of Government roles from service providers to coordination, policy and guidelines

formulation, and regulation. Public consultations conducted for the cause of the study of this project brought stakeholder participation in line with the policy objectives. Furthermore, by undertaking this study, the potential pollution to water resources has been looked upon for the purpose of mitigation.

### **3.2.5 The Energy Policy of Tanzania (2015)**

The policy focuses on utilizing various energy resources, including water, forests, gas, coal, petroleum, sun and wind, in a sustainable and environmentally friendly manner. The policy states that energy is a prerequisite for the proper function of nearly all sub-sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of development endeavours. A significant policy objective on energy end uses the progressive reduction of dependence on imported energy through demand management to reduce the negative effects of continued dependence on imported petroleum products. The policy insists that activities in energy auditing in the developmental project and energy conservation should be done.

Major losses shall be dealt with by the project proponent, and cost-effective solutions or recommendations on ways to reduce energy losses shall be implemented. Thus, the project is in line with the energy policy requirements.

### **3.2.6 The National Construction Policy (2003)**

Construction project, such as construction of ASGM gold ores processing and washing facilities, is among key areas embraced by the construction policy. Among the primary objectives of the policy, which support sustainable construction sector include: to promote the application of cost-effective and innovative technologies and practices to support socio-economic development activities such as water supply, sanitation, shelter delivery and income-generating activities and to ensure application of practices, technologies and products which are not harmful to both the environment and human health. Through this study, the project proponent is expected to abide to the relevant provisions of the policy to ensure compliance of the development.

### **3.2.7 The National Forest Policy (URT, 1998)**

This National Forest Policy is a nationwide sectoral document aiming at an effective management and utilization of forest and tree resources for sustainable supply of products and services to meet local, national and global needs so that forest and tree resources significantly contribute to national livelihood and the global community. In accordance to the policy, Environmental Impact Assessment (EIA) will be required for all investments which convert forest land into other land uses or may cause damage to the forest environment. Although the project area is not surrounded by a protected forest, some of the area surrounding the PML where the project will be located has some forest resources and hence calls for awareness of this policy. For example, some of the policy strategy statements that are relevant for such a project include to enable sustainable management of forest on public lands, clear ownership for all forests and trees on these lands will be defined and management responsibility promoted.

### **3.2.8 The National Employment Policy (2008)**

The major aim of this policy is to promote employment mainly of Tanzania Nationals. Relevant sections of this policy are (i) 10, which lays down strategies for promoting employment and section 10.1 is mainly focusing on industry and trade sectors (ii) 10.6, which deals with the employment of special groups i.e. women, youth, persons with disabilities and (iii) 10.8 which deals with the tendencies of private sectors to employ expatriates even where there are equally competent nationals. During implementation of the

project, the project proponent shall promote this policy by employing many Tanzania of relevant qualifications with priority to the community around and special groups as stated by the policy.

### **3.2.9 The National Policy on HIV/AIDS (2001)**

The major relevance of this policy is to prevent transmission of HIV/AIDS, enhance sectoral roles through participation and financial support to workers engaged in the project. And the proponent should prepare the HIV/AIDS awareness programme to promote awareness of HIV/AIDS among its service providers, communities, and employees. The policy recognizes that HIV infection shall not be grounds for discrimination in relation to education, employment, health and any other social services. Pre-employment HIV screening shall not be required. For persons already employed, HIV/AIDS screening, whether direct or indirect, shall not be required. HIV infection alone does not limit fitness to work or provide grounds for termination. HIV/AIDS patients shall be entitled to the social welfare benefits like other patients among the employees. HIV/AIDS information and education targeting the behavior and attitudes of employees and employers alike shall be part of HIV/AIDS intervention in the workplace. The project proponent will comply with these policy requirements as the proposed project cannot avoid social interactions among its employees and the surrounding/neighborhood community. The proponent shall comply with this policy in prevention and control of HIV among workers and local communities in collaboration with local government.

### **3.2.10 The National Women and Gender Development Policy (2000)**

This policy aims to improve opportunities for women and men to play their full roles in society, recognizing specific gender requirements. The policy aims to minimize shortcomings related to the limited participation of women in most economic development activities. It focuses on using available resources to increase incomes, eradicate poverty and improve living standards. The policy also recognizes and emphasises creating awareness of how environmental degradation increases poor women's burden. The policy aims for full participation of women in natural resource management and encourages the rational use of natural resources to provide new income generating opportunities. The project will comply with the requirements of the policy by taking on board women from employment available and to the decision lines of the ASGM gold ores processing and washing facility project.

### **3.2.11 The National Health Policy (2017)**

This Policy emphasized the need to increase community involvement in health development and improve access and equity in health and health services. One of the main objectives of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in work-places, promotes sound use of water. It promotes the construction of latrines and their use, and encourages the maintenance of clean environment; a working environment conducive to satisfactory work performance. The project proponent shall observe this policy.

## **3.3 RELEVANT NATIONAL PLANS/STRATEGIES**

To guide national development more effectively and systematically, Tanzania has prepared many strategies aiming at operationalizing the various policies in key sectors. Some of the strategies that have a bearing on the proposed project are:

### **3.3.1 The Tanzania Development Vision 2025**

The Composite Development Goal for the Tanzania Development Vision 2025 foresees the alleviation of poverty through an industrial economy, leading to improved socio-economic opportunities, good governance, transparency, and improved public sector performance. These objectives not only deal with economic issues but also include social challenges such as education, health, the environment, and increased involvement of people working for their own development. The thrust of these objectives is to attain sustainable development among the people. The Vision 2025 seeks to mobilize the people, the private sector, and resources of the nation towards achievement of shared goals and achieving a sustainable semi-industrialized middle market economy by 2025. The vision outlines Tanzania's plans and strategic goals covering all sectors of the economy. It outlines institutional changes that must take place to enable Tanzania to make progress suggested in the vision. The proposed project will stimulate local economic growth and contributing to realizing the Vision's objectives.

### **3.3.2 The Third National Five-Year Development Plan (FYDP III; 2021/22 – 2025/26)**

This Plan is the final Plan in implementing the Tanzania Development Vision 2025 as the National overall development framework. The Plan is a continuation of the Government's efforts in enduring exertion to further improve the standard of living for all Tanzanians. The theme of realizing competitiveness and industrialization for human development aims to increase efficiency and productivity in manufacturing using the resources available in the country. Areas of inspiration in the Plan include increasing the country's capacity for production; building a competitive economy that will stimulate the country's participation in trade and investment; and stimulating human development. By investing in this project, the project proponent is promoting the development in Tanzania, which is the focus of the FYDP III.

### **3.3.3 The National Plan of Action to End Violence Against Women and Children (NPA-VAWC) 2017/18-2021/22**

From a situation analysis of this plan, violence is a daily reality for large numbers of women and children in Tanzania. The NPA-VAWC recognizes that reducing violence has positive implications for inclusive growth and has ambitious targets that could positively impact the agency of women and girls. The plan aims to dramatically lower rates of teenage pregnancy, reduce the practice of female genital mutilation/cutting (FGM/C), and drastically reduce child marriage throughout the country. The plan incorporates strategies to help local authorities and police, service providers, and communities better provide prevention and response services that have the greatest potential for reducing violence against women and children.

To put the plan in action, the project proponent should collaborate with other relevant government officials, social welfare officers, religious leaders, and police officers during implementation of the proposed project to end existing Violence against Women and Children.

## **3.4 PRINCIPAL LEGISLATIONS**

Tanzania has a number of laws touching on the environment and social issues. This includes legislation requiring developers to subject their proposed projects to environmental impact assessment. This section addresses the legal and regulatory conditions relevant to the proposed project. The proposed project will need to be planned and operated in general compliance with these legislations. Some of the relevant legislation and regulations that are relevant in the management of the environment include the following:

### **3.4.1 The Environmental Management Act, Cap 191**

The Environmental Management Act cap 191 builds on NEP's vision of a consistent and coherent environmental management framework. The Act introduces a concept of the right of Tanzanians to a clean, safe and healthy environment and the right of Tanzanians to access various segments of environment for recreational, educational, health, spiritual, cultural and economic purposes (Section 4 (1) and (2)). The Act imposes an obligation on developers to:

- i) Comply with license conditions, including the EIA certificate (S.201). The act requires the developer to conduct an EIA before the commencement of the project to determine whether the project may/or is likely to have or will have a significant impact on the environment.
- ii) As land users and occupiers to protect, improve and nourish the land and use it in an environmentally sustainable manner (S. 72)
- iii) Abstain from discharging any hazardous substances, chemicals, oils or their mixture into waters or any segment of the environment (S.110)
- iv) Comply with environmental quality standards (S.141)
- v) Control, manage, and dispose of waste including litter, liquid, gaseous and hazardous wastes (Part IX).

This Act also provides a legal framework necessary for coordinating harmonious and conflicting activities to integrate such activities into an overall sustainable environmental management system by providing key technical support to sector Ministries. As such, the project proponent undertook, this study to comply with EMA requirement.

### **3.4.2 The Mining Act, [Cap. 123 R.E 2019]**

The Act was amended several times and revised in 2019. The Act with substantial amendments, provides regulations prospecting for minerals, mining, processing and dealing in minerals, to granting, renewal and termination of mineral rights, payment of royalties, fees and other charges and any other relevant matters. The Act requires all holder of a mineral right to take appropriate measures for the protection of the environment. Specifically, the Act provides obligation to be adhered to by holders of mineral right for the purposes of making the mining area safe on termination of mining operations. When instituting these obligations, mineral right is required to follow principles, procedures and guidance as prescribed in the Mining Regulations, 2010 (Safety, Occupational Health and Environmental Protection).

### **3.4.3 The Land Act, [Cap. 113 R.E 2019]**

The Act relates to land-use planning processes and management and guidance to land ownership in Tanzania. The laws vest all land in the President and grant occupancy rights to individuals, legal persons and territorial communities. The President is empowered to revoke any landholder's "Right of Occupancy" for the "public/national interest" should the need arise. The President holds land in trust for all citizens and can acquire land for public use and benefit, such as resettle people from densely populated areas to sparsely populated areas, settle refugees, and so forth. The President can also acquire land for other national projects, like water infrastructure. However, the laws declare the value attached to any piece of land and as such, any land rights transfer is subject to compensation. Further, the Act lays down key fundamental principles for occupying and using the land. Among them is the principle that any land user shall ensure that land is used productively and that any such use complies with the principles of sustainable development.

In this respect the proponent intends to use the above-mentioned Primary Mining Licensing area for the proposed development as per land use (mineral processing). The project activities will be conducted in consent with this principle to preserve the environmental integrity of the area. This will be ensured by implementing the Environmental Management Plan as outlined in Chapter 8 of this report.

#### **3.4.4 The Village Land Act, [Cap. 114 R.E 2019]**

The Village Land Act was enacted specifically for the administration and management of land in villages. The Act empowers the village council to manage all village lands in accordance with the principles of a trustee with the villagers being the beneficiaries. In addition, the village council is required to manage land by upholding the principles of sustainable development, relationship between land uses, other natural resources and the environment. Although the proposed project area has the primary mining license and is located in an area that is isolated from any settlements or farms it is still located within land managed under the village land Act and hence the importance of the knowledge of this legislation.

The PML holder has secured the land consent from the local authority for undertaking mining related activities coherent with the requirement of section 52 (d) of the Mining act, 2010.

#### **3.4.5 The Occupation Health and Safety Act, 2003 (Act No. 5/2003)**

This Act makes provisions for the safety, health, and welfare of persons in factories and other workplaces. It also protects persons other than persons at work, against health and safety hazards arising out of or in connection with activities of persons at work. Relevant sections of the Act to the proposed project include Part IV, Section 43 (1) - Safe means of access and safe working place; Prevention of fire; and Part V on health. While welfare provisions include the provision of supply of clean and safe to worker's sanitary convenience, washing facilities and first-aid facility. Section 15 gives powers to the Registrar of the workplace to enter any workplace to perform his duties as provided by the Act. Section 16 requires that factories and workplaces register with the registrar of workplaces before commencing operations. Part VI deals with special safety provisions for workplaces involving handling hazardous chemicals, hazardous processes, or hazardous equipment.

This Act is relevant to the proposed project as the contractor and proponent must ensure a safe working environment for all workers, provide clean and safe water and sanitary and first aid services and how the Health and Safety Management measures shall be implemented by the contractor/proponent throughout the project cycle. The objective of the project is also addressing the occupational Health and safety of small-scale minors and hence it is fully in line with the act requirements.

#### **3.4.6 The Local Government (District Authorities) Acts, [Cap. 287 R.E 2019]**

This Act establishes District authorities for local government, to provide for the functions of those authorities and other matters connected with or incidental to those authorities. Section 55 of the Act enumerates the basic functions of the district authorities. The functions that are relevant to the proposed project are to provide for the prevention and reduction of public nuisances or of nuisances, which may be detrimental to the public health or the good order of the area of the authority and to regulate any trade or business, which may be harmful and detrimental to the public health or a source of public danger, or which otherwise it is in the public interest expedient to regulate, and to provide for the issue of licenses or permits (e.g. building permit) and to facilitate the regulation of any such trade or business, and for the imposition of fees in respect of such licenses. Also, the LGA has the mandate to monitor/ inspect environment and social performance. As such, the provisions under this act have a bearing on this project.

### **3.4.7 The Water Resource Management Act, 2009 (Act No. 12/2009)**

The Act provides for an institutional and legal framework for sustainable management and development of water resources; outlines principles for water resources management; for prevention and control of water pollution; and provides for the participation of stakeholders and the general public in implementing the National Water Policy. The relevant provision of this act is that the water "Shall not be polluted with any matter derived from such use. Also, to such extent, as to be likely to cause injury either directly or indirectly to public health to livestock, or fish, to crops, orchards or garden, which are irrigated by such water or to any product in the processing of which such water is used". According to section 39 (1) of this act, owner or occupier of land on which any activity or process is or was performed or undertaken, or any other situation exists which causes has caused or is likely to cause pollution of a water source, shall take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. Section 88, of part X of the act requires, any person intending to construct a dam or tailing dam is required to apply for a construction permit. Since the project will have tailing storage area this act is relevant to the project.

The holders of PMLs, MLs and SMLs granted under the Mining Act have the duty to safeguard and protect water resources. Mineral right holder shall describe the water resource management according to Water Resource Act as per Sections. 7, 39(1) and 58 and any other provisions of this Act together with its relevant regulations and guidelines. The project proponent will comply with the Water Resource Management Act of 2009.

### **3.4.8 The Workers Compensation Act, 2015**

An Act to provide for compensation to employees for disablement of death caused by or resulting from injuries or diseases obtained or contracted in the course of employment; to establish the fund for administration and regulation of worker's compensation and to provide for related matter. It applies to both workers in the private and public sector. For one to be compensated, the injury must either cause permanent incapacity or make the worker unable to earn total wages for at least three consecutive days. The employer is obliged to pay compensation irrespective of the cause of the accident. It doesn't matter whether the incapacity or death was due to the recklessness of the worker.

Where an injury occurs, an employee is entitled to recover medical expenses and lost wages resulting from the disability, be it temporary or permanent. The law allows for compensation to dependents or personal representatives where the worker is dead. The project proponent respects the provisions of the Workers' Compensation Act and will therefore observe its requirements in addition to safety measures provided in this report.

### **3.4.9 The Land Use Planning Act No.6 of 2007**

The Act provides for the procedures for preparation, administration, and enforcement of land use plans; to repeal the National Land Use Planning Commission, and provide for related matters. The Act has distinctive land use planning authorities in Tanzania laid down with their functions and powers. The power vested to authorities that give them power to enforce approved land use plans, including taking defaulters to the court of law. The project proponent is committed to observing the provisions of this Act and the project is planned under the requirement of this Act. This project has contravened no land land-use plans and there is no issue of conflicts with existing Land Use plans.

#### **3.4.10 The Contractors Registration (Amendments) Act No. 15 of 2008**

The Contractors Registration Board (CRB) is a government autonomous regulatory body established to register all types of contractors and regulate their conduct to protect consumers of construction services in Tanzania. The body is governed by the Contractors Registration Act No. 17 of 1997, amended and published as The Contractors Registration (Amendments) Act No. 15 of 2008. CRB is required to take legal action against unregistered contractors who undertake construction; installation, erection or alteration works; ensure that all construction sites are hoarded; and labour laws, occupational health and safety regulations in the construction industry are adhered to. On executing its construction activities, the project proponent shall therefore appoint a registered contractor and make sure that the Act's provisions are adhered to.

#### **3.4.11 The Engineers Registration Act No. 15 of 1997 and its Amendments of 2007**

The Act provides a restriction that no person other than a registered engineer shall engage in professional engineering work or services, including professional service consultation, planning, designing or responsible supervision of construction or operation in connection with any public or privately owned public utilities, buildings, machines, equipment. Also, processes work or projects where public interest and welfare, or the safeguarding of life, public health or property is concerned or involved, requiring the application of engineering principles and data. Furthermore, the Act stipulates that no person shall employ or continue to employ a professional engineer who is not a registered engineer. The project proponent shall therefore observe the Act's provisions when executing its activities during construction and, if need be, during operations.

#### **3.4.12 The HIV and AIDS (Prevention and Control) Act, 2008**

The Act provides for prevention, treatment, care, support and control of HIV and AIDS. Section 9 of the Act emphasizes HIV and AIDS education in the workplace by demanding every employer in consultation with the Ministry to establish and coordinate a workplace programme on HIV and AIDS for employees under his control. Such programmes should include provision for gender-responsive HIV and AIDS education, distribution of condoms and support to people living with HIV and AIDS. Section 31 prohibits stigma and discrimination based on such other person's actual, perceived or suspected HIV and AIDS status. The project proponent confirms his commitment and responsibilities in taking positive measures to address HIV, AIDS and NCDs issues for employees and the surrounding community. Through implementing this policy, project proponent shall abide by HIV/AIDS Act in the fight against the disease.

#### **3.4.13 The Persons with Disability Act, 2010**

The basic principles of this Act are to respect for human dignity, individual's freedom to make their own choices and independence of persons with disabilities, non-discrimination, full and effective participation and inclusion of persons with disabilities in all aspects of society, equality of opportunity, accessibility, equality between men and women with disabilities and recognition of their rights and needs, and provide a basic standard of living and social protection. Therefore, the proposed project will fulfil this legal requirement in all project phases, design, construction and operation.

#### **3.4.14 The Child Act of 2009**

Part II of the Act defines a child in Tanzania as a person below 18 years. Part II, Section 78 of the Act, provides the prohibition of exploitive labour to children. Every child shall be protected from labour exploitation and any work that is likely to; (a) deprive the child of his/her health or development; (b) exceeds six hours a day; (c) is inappropriate to his/her age, and (d) the child receives inadequate

remuneration. Section 82 of the Act also protects children from sexual exploitation. A child shall be Protected from sexual exploitation and use in prostitution, inducement or coercion to engage in sexual activity and exposure to obscene materials. This Act will protect against child labour, especially during the construction period.

### **3.5 NATIONAL REGULATIONS**

#### **3.5.1 The Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018**

These regulations have provided the list of projects which requires an Environmental Impact Assessment study. Since such a project is likely to have some adverse environmental impacts. An in-depth study is required to determine the scale, extent, and significance of the impacts and identify appropriate mitigation measures. Furthermore, the regulation provides explicitly procedures and guidelines for carrying out the Environmental Impact Assessment in Tanzania. This study has been carried out under these regulations.

#### **3.5.2 The Environmental Management (Registration and Practicing of Environmental Experts) Regulations, 2021**

Section 83 of the EMA (2004) stipulates that the Environmental Impact Assessment shall be conducted by experts or firms of experts whose names and qualifications are registered by NEMC. The NEMC maintain a registry of EA and EIA experts. These regulations also set the code of practice of the experts for which the Environmental Impact Assessment experts for this project subscribe. This study has been carried out by the registered expert by NEMC.

#### **3.5.3 The Environmental Management (Fee and charges) (Amendment) Regulations, 2021**

These Regulations specify the amount of environmental fees for various operating projects and other fees for assessment. Of particular importance to this project is annual fees to enable the Council to undertake to monitor and audits to ensure the environmental obligation stipulated in the ESIA report is adhered to during all project phases. Thus, the project proponent shall adhere to these regulations by paying the required fees timely to the Council.

#### **3.5.4 The Environmental Management (Air Quality Standards G. N. No. 237) Regulation, 2007**

The objective of these Regulations is to establish baseline parameters for ambient air quality and emissions based on practical considerations and acceptable limits, and to enforce minimum air quality standards as prescribed by the National Environmental Standards Committee. The Regulations promote the adoption of environmentally sound technologies by developers and ensure the protection of human health and the environment from air pollution arising from various sources.

The Second Schedule of the Air Quality Standards Regulations, 2007, together with Tanzania Bureau of Standards TZS 845:2005, specifies the maximum permissible emission limits and applicable test methods. During the construction phase, the project will involve the use of construction equipment and vehicles, including earthmoving machinery. Emissions from such equipment and vehicles will be required to comply with the applicable exhaust emission limits prescribed under the relevant national standards for light and heavy-duty diesel engines. Compliance with these standards has been considered in the assessment presented in Table 3.1.

**Table 3.1: Emission limits for Heavy Duty (HD) Diesel Engines**

<b>Pollutant</b>	<b>Limit (g/kWh smoke in m<sup>-1</sup>)</b>	<b>Reference Standard</b>
CO	4.5	Euro I
HC	1.1	Euro I
NoX	8.0	Euro I
PM	0.612	Euro I
Smoke	0.15	Euro III

Under Air Quality Standards Regulation 28, any holder of a permit, owner or occupier of premises is required that all incidences of inadvertent or accidental emissions or pollution in contravention of these standards shall report the incident within seven (7) days. The standards as laid down by these regulations shall be adhered to accordingly by the project as indicated in the monitoring plan of this report.

### **3.5.5 The Environmental Management (Water Quality Standards G. N. No. 238) Regulation, 2007**

The Water Quality Standards Regulations' objective is to protect human health and conservation of the environment, enforce minimum water quality standards prescribed by the National Environmental Standards Committee and the National Environmental Standards Committee. These committees would assist in determining water usage for purposes of establishing environmental quality standards and value for each usage, and ensure all discharges of pollutants take into account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned. Thus, the project proponent shall adhere to these standards as stipulated in Chapters 8 and 9 of this report.

### **3.5.6 The Environmental Management (Soil Quality Standards) Regulation 2007**

These Regulations specify the soil parameters to be adhered to by different operating industries/facilities as standards. The objective of the Soil Quality Standards Regulations is to protect human health and conserve the environment. The project proponent shall adhere to the regulations by monitoring the key parameters as detailed in chapter 9 of this report.

### **3.5.7 The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations, 2015**

The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations (2015) formulated under Sections 140, 147 and 230 of EMA for the control of noise (loud, unreasonable, unnecessary or unusual) and vibration pollution that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Focus areas include:

- i) Noise management by the owner of machinery or occupier of facility or premises to control noise and to install sound level meters for the measurements and monitoring sound.
- ii) Noise emission License issued by NEMC Director-General to owner or occupier of premises whose work or activity is likely to emit noise over the permissible noise levels.
- iii) Compliance order, protection order or stop order issued by NEMC or any other empowered authority when any condition of any license or permit has been breached or
- iv) Prevention orders and improvement notice issued by Environmental inspector to prevent noise and vibration pollution in an amount, concentration or manner that constitute a risk to human health or environment.

- v) The minister may reward any person who will report an incident of incidental concealment or inadvertent emission or noise pollution or excessive vibration.

The objective of the regulations is to protect human health from noise and vibration hazards. In this case, two categories have been defined by the regulations noise and vibration for public health hazards and workers for occupational health and safety hazards. In this case, minimum limits have been established for the ambient environment to protect public health and limits for the protection of workers in the working environment. Thus, the project proponent shall adhere to these standards as stipulated in Chapters 8 and 9 of this report.

### **3.5.8 The Environmental Management (Solid Waste Management) Regulations, 2009**

The regulation state that every person living in Tanzania shall have a stake and a duty to safeguard the environment from the adverse effects of solid wastes and to inform the relevant authority on any activity and phenomenon resulting from solid waste that is likely to adversely affect the public health and environment. Further, the regulation requires the occupier of any premises to be obliged to use appropriate receptacles. Also, regulations require the occupier to comply with such days and approximate times for collection of waste specified by the local government authority having jurisdiction over the premises. Thus, the project proponent shall comply with all these requirements during the implementation of the project in all phases. The management of solid waste should be carried out in accordance with the proposed ESMP.

### **3.5.9 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2019**

These Regulations assign responsibility to all persons and entities in Tanzania to safeguard the environment and human health from the adverse effects of hazardous waste and to notify the relevant authorities of any activities or incidents involving hazardous waste that may pose environmental or health risks. The Regulations further require any hazardous waste handler to ensure the safe handling, storage, treatment, and disposal of such waste and to remain accountable for any environmental damage or harm to human health arising from improper management.

In compliance with these requirements, the project proponent shall observe the provisions of the Regulations throughout the project lifecycle. Particular attention will be given to the proper management of tailings and any hazardous residues, including those potentially containing mercury, to prevent environmental contamination and risks to human health.

### **3.5.10 The Fire and Rescue Force (Safety Inspections & Certificates) amendment Regulations, 2014**

These Regulations cover many aspects, such as administration, responsibilities and powers of the Fire and Rescue Force, its activities, fire and rescue operations, the welfare of its staff, the Minister's power, and the property groups' classification determine the levy. These regulations require fire safety inspections to be conducted and the certificate renewed annually. Failure to renew it within one month incurs a penalty of 25 percent of the fee. Thus, the project proponent shall comply with all these requirements during the implementation of the project.

### **3.5.11 The Water Resources Management (Water Abstraction, Use & Discharge) GN No.190 2010**

These Regulations sets out principles for regulating water abstraction, use and discharge. Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. In general, a water use must be licensed unless a responsible authority waives the need for a licence. The Minister may limit the amount of water which a responsible authority may allocate. The Minister may differentiate between different water resources, classes of water resources and geographical areas. The project proponent shall acquire the permit for boreholes drilling and water use from respective water board.

### **3.6 INTERNATIONAL CONVENTIONS**

Tanzania is party or acceded to several international agreements and conventions relating to the environment. Agreements of potential relevance for the proposed development are briefly mentioned below.

#### **3.6.1 The Convention on Biological Diversity (CBD) (1992)**

Tanzania signed the CBD in 1992 and ratified it in March 1996, thereby committing to the conservation and sustainable use of biological diversity. The objective of the Convention on Biological Diversity (CBD; 1992) is to conserve biological diversity, promote the sustainable use of its components, and encourage equitable sharing of the benefits arising from the utilization of genetic resources (see [www.biodiv.org](http://www.biodiv.org)). Relevant to this project is Article 6 of the CBD, which provides general measures for conservation and sustainable use of biodiversity. Article 14, which requires parties to carry out ESIA on all projects and development which may have adversely impact on the environment. However, the project site is not located within or in vicinity of any protected area, there are forest resources which will be cleared for project development. Nevertheless, landscaping and re-vegetation will be carried out upon completion of the construction works.

#### **3.6.2 The United Nations Framework Convention on Climate Change (1992)**

The UNFCCC or FCCC is an international environmental treaty produced at the UNCED, informally known as the Earth Summit, held in Rio de Janeiro from June 3 to 14, 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Article 4 commits parties to develop, periodically update, publish and make available national inventories of anthropogenic emissions of all greenhouse gases not controlled by the Montreal Protocol (by source) and inventories of their removal by sinks, using agreed methodologies. It commits parties to mitigate GHG as far as practicable. Tanzania having ratified this convention, there is a need to ensure the project activities live within the carrying capacity of the environment and to avoid the emission of potentially atmospheric debilitating gases.

#### **3.6.3 ILO Convention: C138 Minimum Age Convention, 1973**

This Convention C138 (the Minimum Age Convention) provides for a minimum age of 15 years for admission to employment (temporarily set at 14 for some developing countries). The minimum age for access to employment that is likely to 'jeopardize the health, safety or morals of young persons'– that is, hazardous work – is set at 18 years of age (16 under certain conditions). A difficulty arises in relation to the definition of such hazardous work, as there is no international list of the forms of work that are considered as posing a hazard.

According to the Minimum Age Convention, hazardous types of employment or work that are prohibited up to the age of 18 have to be determined by the competent national authorities after consultation with employers and workers (Article 3(2)). The Minimum Age Convention allows 'light work' to be performed by persons aged 13 to 15 (or even 12 to 14 in certain countries), provided: a) it is not likely to be harmful to their health or development; and b) it does not prejudice their attendance of school or vocational training. The convention was ratified by United Republic of Tanzania on 16:12:1998. As such, project proponent shall ensure no child is employed in the project activities.

#### **3.6.4 ILO Convention: C182 Worst Forms of Child Labour Convention, 1999**

The Worst Forms of Child Labour Convention, was adopted by the International Labour Organization (ILO) in 1999 as ILO Convention No 182. The Convention supports the prohibition and elimination of the worst forms of child labour, including slavery, forced labour and trafficking in human beings. The convention was ratified by Tanzania on 12:09:2001 and by ratifying this Convention, Tanzania commits itself to taking immediate action to prohibit and eliminate the worst forms of child labour. Thus, the project shall not employ a child or to its related activities.

#### **3.6.5 ILO Convention: C148 Working Environment (Air Pollution, Noise and Vibration) Convention, 1977**

The objectives of the convention are to protect workers against occupational hazards in the working environment. The convention applies to all branches of economic activity, except where special problems of a substantial nature exist. Parties may accept the obligations of this Convention separately in respect of air pollution, noise and vibration. Measures to be taken for the prevention and control of, and protection against, occupational hazards in the working environment due to air pollution, noise and vibration shall be prescribed by national laws and regulations. Criteria for determining the hazards of exposure to air pollution, noise and vibration in the working environment and exposure limits on the basis of these criteria shall be established by the competent authority.

Tanzania ratified the convention on 30:05:1983 and as such project proponent shall ensure workers are protected against occupational hazards.

### **3.7 WORLD BANK ENVIRONMENTAL AND SOCIAL FRAMEWORK**

The proposed project will be developed and implemented according to the requirements of the World Bank Environmental and Social Framework (ESF). The ESF sets out the World Bank's commitment to sustainable development. The ESF protects people and the environment from potential adverse impacts that could arise from Bank-financed projects and promotes sustainable development. The ESF enables the World Bank and Borrowers to better manage environmental and social risks of projects and to improve development outcomes. The ESF also places more emphasis on building Borrower governments own capacity to deal with environmental and social issues. The ESF offers broad and systematic coverage of environmental and social risks. It makes important advances in areas such as climate change; labor standards; transparency; nondiscrimination; social inclusion; public participation; and accountability including expanded roles for grievance mechanisms.

The ESF codifies best practice in development policies. It brings the World Bank's environmental and social protections into closer harmony with those of other development institutions; and encourages Client countries to use, and improve, their own national environment and social policies, when these policies are materially consistent with the ESF and supported by adequate implementation capacity. The ESF provides an incentive for countries to develop and build their own environmental and social policies and capacity.

### 3.7.1 Environmental and Social Standards

The 10 Environmental and Social Standards (ESSs) set out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts associated with projects supported by the Bank through Investment Project Financing. The Bank believes that the application of these standards, by focusing on the identification and management of environmental and social risks, will support Borrowers in their goal to reduce poverty and increase prosperity in a sustainable manner for the benefit of the environment and their citizens. The standards: (a) support Borrowers in achieving good international practice relating to environmental and social sustainability; (b) assist Borrowers in fulfilling their national and international environmental and social obligations; (c) enhance non-discrimination, transparency, participation, accountability and governance; and (d) enhance the sustainable development outcomes of projects through ongoing stakeholder engagement. The proposed project will apply the ESF. Table 3.2 below presents the ESSs that are anticipated to be relevant.

**Table 3.2: Application of World Bank’s ESSs to the proposed project**

ESSs	Yes/No	Application
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	Yes	The site-specific environmental and social impacts will be managed through this report. The report has been prepared to recommend E&S measures to be incorporated into designs of the proposed project
ESS 2: Labor and Working Conditions	Yes	Workers will be contracted for the construction works and operation of the project. In order, to ensure fair treatment of workers, the project will ensure that terms and conditions of employment (hours, rest periods, annual leave, non-discrimination, equal opportunities and workers organizations) are aligned with the requirements of Tanzania law and ESS2. To protect workers appropriate Occupational Health and Safety (OHS) shall be applied to avoid the risk of ill health, accidents and injuries. The proponent will set labor management procedures with roles and responsibilities for monitoring primary suppliers. If child labor or forced labor cases are identified, the proponent will require the primary supplier to take appropriate steps to remedy them. Where remedy is not possible, the proponent will, within a reasonable period, shift the project’s primary suppliers to suppliers that can demonstrate that they are meeting the relevant requirements of this ESS
ESS 3: Resource Efficiency and Pollution Prevention and Management	Yes	Different activities under the project components aim at avoiding or minimizing adverse impacts on human health and the environment by eliminating the hazard use of mercury in ASGM. The project proponent will adopt Good International Industry Practice (GIIP) alternatives for its environmentally sound and safe management and disposal of resultants wastes.
ESS 4: Community Health and Safety	Yes	The project will not have substantial risk to community health and safety. Only localized negative impacts (like dust emissions noise pollution during transportation of materials etc.) to sensitive receptors will need to be managed. Also, community safety especially is an issue of concern due to

		the influx of the project workers, and later on participants of the project, which might lead to GBV/ SEA/SH, as well as transmission of HIV/AIDs and other communicable diseases. Guidance on HIV/AIDs, COVID-19, GBV/SEA/SH and EHPMP project GRM shall be followed.
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	No	This ESS is not relevant to the proposed Gold Ores Processing and Washing Facilities at Itumbi area.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	No	The project is not located inside or near protected areas and sensitive habitats. In case the project will purchase natural resources commodities such as timber, it will be important to establish the source area and to have a mechanism in place to ensure that the Primary Suppliers are not significantly impacting sensitive ecosystem or degrading natural habitats.
ESS 7: Indigenous People/ Sub-Saharan African Historically Underserved Traditional Local Communities	No	This standard is not considered relevant as the project will mainly be implemented in areas where communities that meet the requirements of ESS7 are generally not available in the area.
ESS 8: Cultural Heritage	No	This ESS is not relevant as the project area has already being used as a mining area and there is no reported cultural sites or heritage sites in the area.
ESS 9: Financial Intermediaries	No	This ESS is not relevant to the project.
ESS 10: Stakeholder Engagement and Information Disclosure	Yes	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 the this study stakeholders engagement has been crucial part of the study in line with this standard.

### 3.8 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

#### 3.8.1 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:

Environmental requirements:

- Environmental: Projects must develop and implement an EMS to assess, manage, and monitor risks and impacts.
- Emissions and Effluents: Projects must meet specific performance levels for air emissions and liquid effluents. The General EHS Guidelines provide standards for common pollutants, while industry specific guidelines address particular issues.
- Waste Management: Projects must have plans for managing and disposing of hazardous and nonhazardous waste. This includes minimizing waste generation and preventing open burning.
- Water Conservation: Measures should be implemented to minimize water consumption in production processes.
- Noise Management: Projects must control noise emissions from construction and operation, with control techniques such as sound barriers and noise containments.

Health and safety requirements

- Occupational Health and Safety (OHS): Projects must implement measures to protect workers from hazards, including proper use of personal protective equipment (PPE) and training.
- Community Health and Safety: Measures must be taken to minimize community exposure to project related hazards, including safety for traffic, hazardous materials transport, and emergency response planning.
- Emergency Planning: Projects must have plans for responding to emergencies like fires, chemical spills, or workplace accidents.

The WBG General EHS Guidelines are relevant to the proposed project as they provide internationally accepted GIIP for relevant EHS issues. The recommendations contained in the guidelines were reviewed during the preparation of this report and were incorporated into the prescribed management and mitigation measures as appropriate.

### **3.8.2 EHS Guidelines for Mining**

The EHS Guidelines for Mining are applicable to underground and open-pit mining, alluvial mining, solution mining, and marine dredging. Potential environmental issues associated with mining activities may include management of the following:-

- Water use and quality;
- Wastes;
- Hazardous materials;
- Land use and biodiversity;
- Air quality;
- Noise and vibrations;
- Energy Use; and
- Visual Impacts.

The recommendations contained in the guidelines were also reviewed and incorporated into the prescribed management and mitigation measures as appropriate. Further, the guidelines provides

minimum standard limits which are required to be monitored and adhered to where applicable and these include;-

**Table 3.3: Effluent Guidelines**

Pollutants	Units	Guideline Value
Total Suspended Solids	mg/L	50
pH	S.U.	6 – 9
COD	mg/L	150
BOD <sub>5</sub>	mg/L	50
Oil and Grease	mg/L	10
Arsenic	mg/L	0.1
Cadmium	mg/L	0.05
Chromium (VI)	mg/L	0.1
Copper	mg/L	0.3
Cyanide	mg/L	1
Cyanide Free	mg/L	0.1
Cyanide WAD	mg/L	0.5
Iron (total)	mg/L	2.0
Lead	mg/L	0.2
Mercury	mg/L	0.002
Nickel	mg/L	0.5
Phenols	mg/l	0.5
Zinc	mg/L	0.5
Temperature	°C	<3 degree differential
Note: Metals concentrations represent total metals.		

Source: EHS Guidelines for Mining, IFC/World Bank, 2007

**Table 3.4: Minimum average illumination for mine location activities**

Location / activity	Minimum Illumination (Lux)
Emergency lighting	5
Walkways and passages	5 -10
Dynamic locations - production and development areas.	5 - 50
Areas with occasional and simple manual tasks	50 -100
Workstations and areas with medium to high precision manual tasks	150 – 400

Source: IFC/World Bank, 2007: EHS Guidelines for Mining

### 3.8.3 EHS Guidelines for Construction

The World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Construction are directly applicable to the site preparation, civil works, and erection phases of the proposed Gold Ores Processing and Washing Facilities. This industry-specific guideline provides technical guidance on Good International Industry Practice (GIIP) for managing the distinct environmental, health, and safety risks associated with construction activities

The Construction EHS Guidelines address the management of key issues relevant to the project's development phase, including but not limited to:

- i. Site Preparation and Earthworks: Guidance on erosion and sediment control, soil stabilization, and managing site runoff to protect water quality.
- ii. Emissions and Noise: Control of dust, exhaust emissions, and noise from construction equipment and activities to minimize impacts on workers and nearby communities.
- iii. Waste Management: Procedures for the proper handling, segregation, recycling, and final disposal of construction and demolition waste (e.g., concrete, wood, and packaging).
- iv. Management of Hazardous Materials: Safe storage, handling, and disposal of fuels, oils, paints, and solvents used during construction.
- v. Worker Health and Safety: Protocols for traffic management on site, safe use of machinery, electrical safety, fall protection, and emergency response planning specific to construction sites.
- vi. Community Health and Safety: Measures to secure the construction site, manage increased traffic, and prevent accidents involving community members, particularly vulnerable groups.

The recommendations and performance standards outlined in the EHS Guidelines for Construction have been reviewed during the preparation of this report. Appropriate control measures and management plans derived from these guidelines have been incorporated into the project's Environmental and Social Management Plan (ESMP) and other relevant mitigation frameworks to ensure that the construction phase aligns with international good practice

### 3.9 INSTITUTIONAL FRAMEWORK

The Tanzania EIA practice gives different functions and responsibilities to all parties involved in the EIA process of any proposed development undertaking to which EIA is obligatory. Table 3.5 provides key institutions to the proposed project. The Environmental Management Act (EMA, Cap 191) give mandate to NEMC to undertake enforcement, compliance, review and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision-making, exercise general supervision and coordinating over all matters relating to the environment. The Act empowers NEMC to determine whether a proposed project should be subjected to an EIA, approves consultants to undertake the EIA study, invites public comments and has the statutory authority to issue the certificates of approval via the Minister responsible for environment. NEMC is currently the designated authority to carry out the review of ESIA including site visit and handling Technical Advisory Committee (TAC) meeting, monitoring and auditing of environmental performance of the project (periodic and independent re-assessment of the undertaking).

**Table 3.5: Key Institutions to the ESIA Process**

Level	Institution/Group	Role and Responsibility
National level	President's Office – Regional Administration and Local Government	Responsible for matters relating to Regional Administration and Local Government, including giving policy guidelines necessary for the promotion, protection and sustainable management of the environment.
	Vice President's Office (Division of Environment)	<ul style="list-style-type: none"> <li>• Coordinate various environment management activities in Tanzania.</li> <li>• Advise the Government on legislative and other measures for the management of the environment.</li> <li>• Advise the Government on international environmental agreements</li> <li>• Monitor and assess activities, being carried out by relevant agencies in order to ensure that the environment is not degraded</li> <li>• Prepare and issue a report on the state of the environment in Tanzania.</li> <li>• Coordinate the implementation of the National Environmental Policy.</li> </ul>

Level	Institution/Group	Role and Responsibility
	National Environment Management Council (NEMC)	<ul style="list-style-type: none"> <li>• Carry out environmental audit and environmental monitoring.</li> <li>• Carry out surveys which will assist in the proper management and conservation of the environment.</li> <li>• Undertake and co-ordinate research, investigation and surveys in conservation and management.</li> <li>• Review and recommend for approval of environment impact statements.</li> <li>• Enforce and ensure compliance of the national environmental quality standards professional indemnity insurance.</li> <li>• Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation and evolve remedial measures where accidents occur.</li> <li>• Undertake in co-operation with relevant key stakeholder's environmental education and public awareness.</li> <li>• Render advice and technical support, where possible to different stakeholders.</li> </ul>
	Ministry of Minerals (Mining Commission)	<ul style="list-style-type: none"> <li>• Issuing licences for ASM and enforcement of laws and regulations in accordance with the Mining Act, 2010.</li> <li>• Oversee implementation of the Mining Policy;</li> <li>• Enforcement of laws and regulations for mining and protection of environment;</li> <li>• Environmental monitoring and auditing;</li> <li>• Mining projects EIS and EMP approvals (through a multi-sectoral committee);</li> <li>• Mining conflict resolutions.</li> </ul>
	Ministry of Lands, Housing and Human Settlements Development	<ul style="list-style-type: none"> <li>• Issuing rights of occupancy,</li> <li>• Overseeing land use planning and issues relating to compensation and physical and economic resettlement (if any)</li> </ul>
	Ministry of Water Basin Water Offices	<ul style="list-style-type: none"> <li>• Responsible for issuing water use permits,</li> <li>• Enforcing laws and regulation of water quality and utilisation, as well as permitted discharge levels.</li> <li>• Co-operate between sectors at the local level.</li> <li>• Resolve conflicts between water users.</li> </ul>
	Ministry of Natural Resources and Tourism	<ul style="list-style-type: none"> <li>• The ministry is responsible for management of forest reserves, national parks and wildlife protected areas and protection of cultural resources. It plays a key role when ASM operations conflict with protected areas and cultural resources.</li> </ul>
	Occupational Safety and Health Authority (OSHA)	<ul style="list-style-type: none"> <li>• Registration of the workplace</li> <li>• Issuance of OSHA Compliance certificate</li> <li>• Inspection on OSH related aspects</li> <li>• Enforcement of Occupational Health and Safety Act, 2003 (Act No. 5/2003)</li> </ul>

Level	Institution/Group	Role and Responsibility
	Resident mine offices	<ul style="list-style-type: none"> <li>• These are responsible for overseeing mining regulations in relation to safety,</li> <li>• Security and licensing; and</li> <li>• Sustainable exploitation of mineral resources in the area.</li> </ul>
	Government Chemist Laboratory Agency – Zonal Office	<ul style="list-style-type: none"> <li>• Deals with permits relating to chemical handling, management, usage and disposal.</li> </ul>
Project Funding Institutions	World Bank	<ul style="list-style-type: none"> <li>• Project financing</li> <li>• Ensure the project is carried out to the highest environmental standards strictly in accordance with the ESIA and the mitigation measures set out in the ESMF.</li> <li>• Provide second line of monitoring compliance and commitments made in the ESMPs through supervision.</li> </ul>
Project Proponent	Vicent Bruno Minja / PIT	<ul style="list-style-type: none"> <li>• Project implementation including mitigation measures.</li> <li>• Ensure environmental compliance.</li> </ul>
Regional level	Regional Secretariat Office	<ul style="list-style-type: none"> <li>• Responsible for environmental coordination of all advice on environmental management in the region and liaises with the Director and the Director General on implementation and enforcement of the Environment Act.</li> <li>• A Regional Environment Management Expert appointed by the Minister responsible for Regional Administration heads the secretariat.</li> <li>• The Regional Environment Management Expert is responsible for advising the local authorities on matters relating to the implementation and enforcement of the Environment Act. The Expert links the region with the Director of Environment and Director General.</li> <li>• Advice on implementation of development projects and activities at regional level.</li> </ul>
Council level	District Executive Director Office	<ul style="list-style-type: none"> <li>• Executive Officer for all development activities at the district level</li> <li>• Baseline data on social and economic conditions</li> <li>• Extension services</li> <li>• Plan and coordinate activities on community-based natural resource and environment management</li> <li>• Enforcement of laws and regulations</li> <li>• Coordinate environmental matters at the district level</li> </ul>
Ward Level	Ward Development Committees – (Ward Councilor, WEO, Environment Committee	<ul style="list-style-type: none"> <li>• Oversee general development plans for the Ward.</li> <li>• Provide information on local situation and Extension services</li> <li>• Technical support &amp; advice</li> <li>• Project Monitoring</li> </ul>

Level	Institution/Group	Role and Responsibility
Village/ Community level	Village Council (Chairman /NEO, Environment Committee); Other leaders - Religious, Teachers, Elders, Vulnerable Groups etc)	<ul style="list-style-type: none"> <li>• Information on local social, economic, environmental situation</li> <li>• View on socio-economic and cultural value of the sites and on proposed project operations.</li> <li>• Rendering assistance and advice on the implementation of the project</li> <li>• Project Monitoring (watchdog for the environment, ensure well-being of residents and participate in project activities</li> </ul>
	Local NGO / CBO and academic institutions	<ul style="list-style-type: none"> <li>• With direct interest in the proposed Project, and its social and environmental aspects and that are able to influence the Project directly or through public opinion.</li> <li>• Monitoring and management of the project area</li> <li>• Forest/environment conservation</li> <li>• Socioeconomic development in the area</li> </ul>

## 4.0 BASELINE DATA AND INFORMATION

### 4.1 INTRODUCTION

This chapter provides a description of relevant environmental, social, and economic characteristics of the project area (site specific), areas in the immediate vicinity of the project area, and a broad description of the area of influence, i.e., Matundasi Ward and Chunya District. The various sections' details depend on the interactions between the project activities and the particular environmental or socio-economic aspect. The Consultant relied on secondary data and information found in literature covering the project area and observation at the site. Information provided in this chapter will be superimposed on to the project concept and components for impact identification, evaluation and development of mitigation measures.

### 4.2 LOCATION AND ADMINISTRATIVE BOUNDARIES

To plan, organize and run its activities, the Proponent at Itumbi area need to be associated with various local government bodies from the regional level to District, Ward and Village level. The project site is under the jurisdiction of Mbeya Region, Chunya District Council, Matundasi Ward, Itumbi Village. The district is located in the North - Western part of the region and is among of the seven districts of the region. It lies between 7° and 9° Latitudes South of the Equator and between 32° and 34° Longitude East of Greenwich. It is bordered to the north by Tabora Region to the northeast by Singida Region, to the east by Mbarali District, to the south by Mbeya Rural District, and to the west by Songwe District.

Administratively, the district is divided into 2 divisions (Kiwanja and Kipembawe) and 20 wards which are subdivided into 43 villages, 35 streets and 203 hamlets. Kiwanja division has more subdivisions than Kipembawe division with 11 Wards, 19 villages, 35 streets and 87 hamlets while in Kipembawe division there are 9 Wards, 24 villages and 116 hamlets. The district has only one Constituent namely Chunya.

### 4.3 PHYSICAL CHARACTERISTICS

#### 4.3.1 Climatic Condition

##### *Temperature*

The district average temperature ranges between 21° and 23° centigrade annually and this is very much influenced by physiography and altitude. The recent five years average data for minimum temperature shows the range of 14.1° to 19°, June and July being coldest months of the year (see table 4.1a below). Also, the recent five years average data for maximum temperature shows the range of 25.1° to 30.6°, September, October and November being the hosts months of the year (see table 4.1b below).

**Table 4.1a: Chunya monthly minimum temperature (°C)**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2018	17.2	17.6	16.8	16.6	16.0	14.2	14.4	15.3	17.1	18.5	19.1	18.2
2019	17.7	17.7	17.5	17.5	17.1	13.6	14.6	15.7	17.7	18.7	19.3	18.2
2020	18.0	17.7	17.6	17.2	15.8	14.6	13.7	15.6	17.0	18.9	18.7	17.9
2021	17.4	17.2	16.8	16.8	15.1	14.3	13.6	15.7	17.5	19.0	19.4	19.4
2022	18.1	17.1	17.4	17.0	15.5	13.9	14.2	15.4	16.6	18.0	18.8	18.1
Mean	17.7	17.4	17.2	17.0	15.9	14.1	14.1	15.5	17.2	18.6	19.0	18.4

Source: TMA, 2013

**Table 4.1b: Chunya monthly maximum temperature (°C)**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2018	24.1	26.4	24.8	24.9	26.1	26.2	25.6	28.5	29.7	29.8	29.1	26.6
2019	25.9	26.3	27.0	26.6	26.0	26.2	27.2	29.1	30.2	30.5	29.6	25.8
2020	25.2	25.5	25.2	25.0	26.0	25.9	25.5	28.2	29.8	30.2	29.1	26.0
2021	24.8	25.2	25.3	25.2	26.0	26.0	25.7	28.5	29.8	30.7	30.5	29.7
2022	25.3	24.1	25.8	26.2	26.3	25.2	25.8	28.2	29.7	31.5	29.4	26.3
<b>Mean</b>	25.1	25.5	25.6	25.6	26.1	25.9	26.0	28.5	29.8	30.6	29.5	26.9

Source: TMA, 2013

### **Rainfall**

The district means annual rainfall ranges from 600 mm and 1000 mm. Normally the peak period of heavy rains is recorded during the months of December and March almost every year. (URT, 2018). The recent five years monthly mean rainfall in Chunya shows with maximum average of 336.4 mm. Heavy rains remains in the same months from December to March (see table 4.2 below).

**Table 4.2: Chunya Average monthly precipitation in mm**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2018	281.7	131.4	234.2	145.2	7.9	0.0	0.0	0.1	0.6	7.2	25.0	260.7
2019	191.1	225.9	263.3	93.1	7.9	0.1	0.0	0.0	0.0	7.3	73.8	235.3
2020	303.1	218.5	426.9	75.5	8.0	0.4	0.0	0.0	0.5	4.1	53.8	186.9
2021	242.9	233.8	210.0	69.5	16.6	0.0	0.0	0.0	0.0	7.8	20.9	142.3
2022	663.1	404.7	269.1	48.9	7.8	0.0	0.0	0.0	0.8	0.0	37.4	318.5
<b>Mean</b>	336.4	242.9	280.7	86.4	9.6	0.1	0.0	0.0	0.4	5.3	42.2	228.7

Source: TMA, 2013

### **Wind speed**

The wind speed data of Chunya was obtained from Tanzania Metrological Authority (TMA) in which monthly averages for the five past years are presented in table 4.3 below. The highest average wind speed was 7 knots recorded in the month of October while the lowest average wind speed was 2 knots recorded in the month of January, February and March.

**Table 4.3: Chunya Average monthly wind speed in knots**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2018	2	3	3	3	5	4	5	6	7	6	5	2
2019	2	2	2	4	5	3	4	6	6	7	5	2
2020	2	1	2	3	4	4	4	5	5	6	5	1
2021	2	1	3	4	3	4	5	5	6	6	5	6
2022	2	2	2	4	4	4	5	5	6	7	5	3
<b>Mean</b>	2	2	2	4	4	4	5	5	6	7	5	3

Source: TMA, 2013

### **4.3.2 Topography and drainage**

The topography of the project site is flat inclined towards the eastern side. Thus, the overland flows towards the eastern side on the plains which act as depository. Further to the east about 4 kilometers is a small tributary of Lupa River. Lupa River is about 6.5 kilometers from the site towards the same direction, it flows toward Songwe River that drains into Lake Rukwa. Thus, hydrologically the area falls under Lake Rukwa Basin.

Chunya district lies at an altitude of 500 meters to 1,000 meters above sea level. The district is characterized by a hilly landscape (Stretching from Mbeya hills with a gentle slope mostly covering the Kiwanja division) with thick forests, miombo woodlands, scattered trees, bush and thickets. Also, the district has plateau between Ibagu plains and Chunya mountain range. The main permanent drainage system includes rivers Songwe, Lupa and Zira all originating from Mbeya hills. On the other hand, 18 non-permanent rivers (seasonal) exist and mostly flow during rainy season.

Commonly known sources of those rivers include Chunya mountain range and Mbeya hills. Most of the rivers of the districts flow towards Lake Rukwa. The project area is under Lupa river catchment, and the site is about 6.5 kilometers to the western side. The river flows toward Songwe River that drains into Lake Rukwa. Thus, hydrologically the area falls under Lake Rukwa Basin.

### **4.3.3 Geology and Soils**

The soil of the district is mostly characterized with shallow stony with low fertility. These have deep quartz dominated sands of Albic Arenosols with Orthic ferralsols, Ferralic Arenosols and Ferralic Cambisols. They occur as red sand, pale sand, good for tobacco, maize, sorghum, finger millet, sweet potatoes, cassava, and groundnuts. The project area soil is characterized with clay loam soils with rock fragments.

The geology of the area is characterized with country rocks that are made up of granitic gneisses with amphibolitic bands that strike NW-SE and dip steeply towards SW. The country rocks are intruded by plutons and dykes of mafic and felsic composition. Mylonites and chlorite-sericite-epidote shists occur along the shear zones. The Ubendian rocks of the Bukoban supergroup. The rock sequence is capped locally by Cenozoic volcanic rocks and sediments.

### **4.3.4 Water and soil quality**

A borehole water sample was collected from the onsite borehole for laboratory analysis. The results are presented in Table 4.4 below, while the actual laboratory results are appended as Appendix 6 to this report. If compared to Tanzanian drink water standards, all analyzed parameters were below the upper limit of the standard. This implies that the groundwater of the area is not polluted as per the analyzed parameters. Further, most of the heavy metals analyzed were below the detection limit of the equipment i.e. <0.01 mg/l with the exception to Lead with 0.016 mg/l.

**Table 4.4: Water quality of the Itumbi site**

S/n	Parameter	Units	Borehole water	EM(WQS) - Drinking Water Specification
1	pH		7.59	6.5 – 9.2
2	Copper	mg/l	<0.01	1.0 - 3.0
3	Lead	mg/l	0.016	0.0 - 0.1
4	Zinc	mg/l	<0.01	5.0 - 15.0
5	Cadmium	mg/l	<0.01	0.0 – 0.05
6	Chromium	mg/l	<0.01	0.0 – 0.05
7	Nickel	mg/l	<0.01	NM
8	Sodium	mg/l	<0.01	NM
9	Potassium	mg/l	<0.01	NM
10	Magnesium	mg/l	<0.01	500 - 1000
11	Mercury	Mg/l	<0.01	0.01

**Note:** NM- Note mentioned

Source: Laboratory Analytical Results, January 2026

Soil samples were also collected for laboratory analysis and this included pit soil sample and surface soil sample. The results are presented on table 4.5 below while the actual laboratory results are appended as appendix 7. The analyzed soil samples were compared with the Tanzanian Soil Standards for the contaminants in habitat and agricultural soils for heavy metals. All analyzed heavy metals were below the limits of the standards implying that the area is not heavily contaminated with the heavy metals analyzed. Further, the results of the heavy metals analyzed were in normal range in the general soil environment noting no exceptional levels.

**Table 4.5: Soil quality of the Itumbi site**

S/n	Parameter	Units	Pit Soil	Surface Soil	EM(SQS) – Contaminants limits for heavy metals
1	pH		6.61	6.99	NM
2	Copper	mg/kg	2.015	2.010	150
3	Lead	mg/kg	2.252	5.074	200
4	Zinc	mg/kg	23.678	18.716	150
5	Cadmium	mg/kg	2.583	3.566	1
6	Chromium	mg/kg	5.759	4.116	NM
7	Nickel	mg/kg	13.628	7.970	100
8	Mercury	Mg/kg	0.05	0.05	2

Note: NM- Note mentioned

Source: Laboratory Analytical Results, January 2026

#### 4.3.5 Ambient air quality

A spot baseline air quality survey was conducted by client to ascertain the concentration of respirable particulates in the project area prior to the construction and operation of the proposed project. The dust levels in terms of particulate matter (PM2.5 and PM10) were measured on site. Based on the spot measurement the average dust (PM10) level were in the range of 0.28 to 0.16 mg/m<sup>3</sup> which were above the permissible limits of both local and international standards (table 4.6).

**Table 4.6: Ambient particulate matter quality of the Itumbi site**

Name of station & Coordinates	PM <sub>2.5</sub>	PM <sub>10</sub>
	mg/m <sup>3</sup>	mg/m <sup>3</sup>
Itumbi (1A) 8° 21'59"S 33°19'13"E	0.098	0.163
Itumbi(1B) S8°22'30" E33°18'59"	0.221	0.253
Itumbi (1C) 8° 21'49"S 33°17'55"E	0.26	0.287
<b>EM (Soil quality) Specification</b>	<b>0.075</b>	<b>0.15</b>
<b>WHO/IFC (2007) and WB AQG 2006</b>	<b>0.025</b>	<b>0.05</b>

Source: NEMC, August 2023.

#### 4.3.6 Ambient noise

The noise level at the project site was measured to establish the baseline condition before commencement of construction activities. Based on site assessment there is continuous noise emission from the operating crashes of the PML owner. This is the main noise source at site. The average noise was between 41 dBA and 53 dBA at the three established stations of the site (see table 4.7 below). The noise levels were below the recommended limits of the local standards in working areas regarded as industrial area. The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations, 2015, stipulates maximum permissible day time noise levels of 70 dB(A) for industrial area. Also, the regulations provide maximum permissible noise levels of 55 dB(A) daytime and 45 dB(A) nighttime for residential and industry/small scale production and commerce (table 4.8 below). The noise levels of 55 dB (A) daytime and 45 dB (A) nighttime will be applied in assessing and monitoring noise impacts in the communities

**Table 4.7: Ambient Noise levels at Itumbi site**

S/N	Name of station	GPS Coordinate	Noise Level
1.	Itumbi (N1)	S8° 21'59" E 33°19'13"	53.4 dBA
2.	Itumbi (N2)	S 8° 22'30" E33°18'59"	44.3dBA
3.	Itumbi (N3)	S8° 21'49" E33°17'55"	41.0dBA

Source: NEMC, August 2023.

**Table 4.8 (a): Maximum Permissible Noise levels for the general environment**

FACILITY	NOISE LIMITS in dBA (L <sub>eq</sub> )	
	DAY	NIGHT
Any building used as a hospital, convalescence home, home for the aged, sanatorium, and learning institutions, conference rooms, public library, and environmental and recreational site	45	35
Residential building	50	35
Mixed residential (with some commercial and entertainment)	55	45
Residential and Industry/small-scale production and commerce	60	50
Industrial area	70	60
TIME FRAME	6:00 am -10:00 pm	10:00 pm-6:00 am

Source: Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations, 2015

Table 4.8 (b) World Bank Group Environmental Noise level guidelines

FACILITY	NOISE LIMITS in dBA (L <sub>eq</sub> )	
	DAY	NIGHT
Residential, Institutional; educational	55	45
Industrial; Commercial	70	70
TIME FRAME	0700 -2200	2200 -0700

## 4.4 BIOLOGICAL CHARACTERISTICS

### 4.4.1 Flora

A large portion of land of the district is covered by natural vegetation. The most predominant natural vegetation is miombo woodlands, with vast areas in Kipembawe Division. Common vegetative species include those of branchystigea, dalbegia, Pteracarpus. The vegetation of the project area is also miombo woodland. The dominant species in the area include Brachystegia spiciformis, Brachystegia boehmii, and Julbernardia globiflora

### 4.4.2 Fauna

There is no large wild animal in the project area due to human influence in the area. The small scale artisanal miners are covered in large area of the Matundasi Ward which is one of the aspect to deter large wild animals to dwell or visit the area. Nevertheless, some small mammals are reported to be sighted once in a while and these include Klipspringer, Fox, bush pig, while the common one in the area are monkeys. Also, reptiles, birds and insects are present in the area.

### 4.4.3 Unique biodiversity

The project area is not located within a nationally or internationally designated area which could represent the more sensitive ecosystem. As far as the scope of this ESIA study is concerned, there is no known endangered, threatened or endemic animal or plant species at the project site.

## 4.5 LAND USE

There are no residential households or any other structure/property within the core project site. The core site is having abandoned mine pits and disturbed grasses, bushes and trees species. In addition, during the visit, there was only mining activities within the immediate area of the project site under the PML owner. The office buildings are about 80 meters from the site to the west southern side. Further, there is no development activity within the earmarked project site.

The wider project area covers villages with residential areas, agricultural land parcels, forests and grazing land. Cropland is mostly located adjacent to or near the homestead. At the village centers like Itumbi, there are small businesses (small shops, kiosks, etc.) as well as local institution such as dispensaries, school, religious (churches), village government offices, cemetery, etc. Major needs for land in the area include crop production, grazing land, building plots for residential, commercial, institutional and other production activities. However, mining activities play a big economic role of the village.

## 4.6 SOCIO-ECONOMIC SET - UP

### 4.6.1 Population Characteristics

Villages and ward population data are very important for fair allocation of the project available employment opportunities and in planning of the sustainable initiative support programme. According to the 2022 National Census, Matundasi Ward was found to have a total population of 26,073 (14,294 male and 11,779 female) with an average household size of 3.5. The mining activities in the area have attracted more people in the ward, especially young men. The number of males has exceeded the number of females. In the study area majority of people were males. Different gender distribution was recorded to be 54.8% males and 45.2% females. Table 4.9 below presents demographic data of the Mbeya Region, Chunya District Council, and Sangambi Ward.

**Table 4.9: Population of Mbeya Region, Chunya District Council, and Sangambi Ward**

Council	Population			Sex Ratio	Number of Households	Average Household Size
	Both Sexes	Male	Female			
Mbeya Region	2,343,754	1,123,828	1,219,926	92	630,102	3.7
Chunya District Council	344,471	176,457	168,014	105	85,999	4.0
Matundasi	26,073	14,294	11,779	121	7,450	3.5

Source: NBS, 2022

### 4.6.2 Ethnic Groups

The main indigenous ethnic groups in the Region are Nyakyusa, Bungu, and Safwa. Others who form significant minorities are the Kisi, Malila, Masai, Kinga, Hehe, Wanji, Sukuma and the Sangu. Due to the mining activities, the project area is inhabited by various ethnic groups. The major ethnic groups in the general area are Kimbu, Nyakyusa, Sukuma, Bena, Nyamwezi and Sangu.

### 4.6.3 Employment Status

According to information from the WEOs interviewed as part of this scoping study, within the area self-employed persons in agriculture have the largest share (64%) of total employed persons followed by those working as self-employed in non-agriculture (25.2%), mining workers (6.5%) and the family paid employees (3.9%). The remaining employment statuses contribute less than 1 percent of total employment (CDC, 2022). Sub-sectors like small-scale handcraft, construction works, carpentry, vegetable hawking, petty commercial activities and lumbering play an insignificant role in the economy of the project area as well.

### 4.6.4 Economic Base

#### ***Mineral Resources***

Mining sector in Chunya district is the leading source of revenue to the council's economy. Mining activities in this district are done in traditional way and modern way. There are 219 mineral deposits found in Chunya District where Gold is extracted by small scale miners. Mineral deposits in the district are found in Kiwanja division in eleven wards namely; Chalangwa, Sangambi, Ifumbo, Mbugani, Itewe, Kasanga, Chokaa, Matundasi, Bwawani, Makongolosi, and Mkola wards.

In the district most of the mining operations are undertaken by small-scale operators using tools with little capital, skills and technology to utilize fully the available opportunities. There is no major mining plant with enough equipment and technology of utilizing the available mining opportunities in the district. In 2015 the amount of Gold sold was 455,587.81 gramme that contributed TZS 22,712,917,418 as the revenue to the district. Currently there are no records of amount of Gold produced, sold and the revenue obtained at ward level where mining activities is taking place (CDC, 2022).

### ***Agriculture***

Agriculture is one of major contributor of the Economy of Chunya Council since majority of the people depend on it for food consumption and small portion for business. Many people depend on agriculture though they are using low level of technology in crop production and some people keep livestock for food. Although agriculture is the second leading sub-sector in the economy of the council, its performance has been declining due to several factors such as use of inferior tools including hand hoes, plough, inadequate knowledge of new agricultural products, pest problems, lack of enough improved seeds, lack of fertilizer and insufficiency of agricultural and livestock personnel. Climatic change also is the major factor affecting agriculture production since many people depend on rain in crop production.

Apart from mining activities, economically active population in the villages within the project area are also farmers and their livelihoods depend on those farming activities. Traditional small hand hoe is the main implement used by farmers. Agriculture products contribute much on the revenues of the households. The main crops grown in the area are sorghum, millet, maize, cassava, groundnuts, sweet potatoes and Irish potatoes together with various fruits. In most gold mining zone, the soil is sandy with low fertility with traces of ferralic arenosols and red sand.

### ***Livestock keeping***

Livestock just like farming is an important economic endeavor of the people of the project area that plays multiple roles in the livelihood strategies of rural communities. Livestock is linked to social status through accumulation of wealth and savings. It also, provides a variety of benefits to rural communities such as risk mitigation, food security and improved nutrition. However, the level of animal husbandry in the project area is low. The main livestock in the project area are cattle, goat, sheep and chicken for subsistence and income generation. Livestock farming generates income to households and revenue to the District Council through various fees on livestock products, services and facilities.

Livestock diseases are amongst the factors which adversely affect livestock production and productivity in the area and hence need for a control. Major cattle diseases found in Chunya District Council are Helminthiasis, East Coast Fever, Mange, Anaplasmosis, Foot and Mouth Disease and Lumpy Skin Diseases. Livestock disease control plays an important role in improving the livelihood not only of the livestock keeping community, but also for indirectly boosting the regional economy through widening the extent of market for livestock products.

### ***Natural Resource***

The natural resources products are another sector which form an important part of the livelihoods of the population in addition to their agricultural and livestock keeping activities. The project villages depend on indigenous trees and planted trees found in nearby villages. Forest-related products such as timber, logs, firewood, honey, food/fruit and building poles are locally harvested.

#### **4.6.5 Economic Infrastructure**

##### ***Road networks***

The project site is accessed by a 15 km unpaved road branching off from the main Chunya – Mbeya Road. The Chunya – Mbeya Road is asphaltic single lane road which connect the project site with the regional centre. The majority of the roads in the project area are district roads which are maintained by the district council. The roads serving the project area (district and feeder roads) are earth surfaced (marram) with poor condition and not suitable for public use particularly during rainy seasons. The roads are not adequately maintained and rehabilitated. Generally, the Chunya District Council Road networks has total number of 699.1 kilometers, whereby Kiwanja division covers the longest road network (380.3 kilometers) while Kipembawe division has a total of 318.8 kilometers. Feeder roads accounts for the longest road network of 291.7 kilometers (41.7 percent) followed by Trunk roads (260.3 kilometers) and district/urban roads with 147.1 kilometers (21.0 percent) (CDC, 2022).

##### ***Air Transport facilities***

Chunya DC is served by three (3) airstrips located at Kiwanja, Mwipa and Miwanga villages, whereby the two airstrips at Mwipa and Miwanga are specifically for hunting Tourists. These airstrips are mostly accessed by light private charter aircraft and not scheduled passenger flights.

##### ***Communications network***

In the project area, the telecommunication service providers available are Tigo, Vodacom, Halotel and Airtel and are accessed at the Villages centres. The remote areas not near the village centres have no cell-phone network connection, however some of the cell-phone networks can be accessed from elevated areas. Generally, Chunya district inhabitants have access to several mobile phone's services providers (Tigo, Vodacom, Airtel, Zantel, Halotel and TTCL- Mobile), radio and television stations broadcasted (ITV, TBC1/TBCFM, Clouds FM/TV, EATV/Radio, KISS FM, Ilas FM, Bomba FM), Post office, and internet centres (CDC, 2022).

##### ***Energy***

The project area is connected to the National Grid System, and electricity is available in the surrounding areas. The proposed project will utilize grid electricity as its primary source of energy for both construction and operational activities. Within the surrounding communities, electricity access is generally available, with households using grid power mainly for lighting and other basic domestic needs.

Despite the availability of electricity, wood fuel and charcoal remain commonly used sources of energy for cooking and other household purposes in the surrounding areas. These fuels are mainly sourced from nearby forested areas, with fuelwood collection largely undertaken by women.

#### **4.6.6 Social Services**

##### ***(i) Health facilities and services***

At Igundu village, there is one government owned dispensary with registration number 101588-2 and registered ID number 4348. This dispensary provides “Mother and Child Healthcare (MCH) services to the mothers and children. According to the WEO, the health services available are not sufficient for the growing number of people. He complained that, most of the time, there is not enough medicine; patients are obliged to buy medicine in the pharmacies around the area. The most common diseases in the area include Neonatal Asphyxia, Pneumonia, Malaria, HIV/AIDS, Diarrhea, Meningitis Cryptococcal, Neonatal Septicemia, Trauma, Hypertension and TB. According to WEO, most of the deaths are caused by Neonatal Asphyxia and Pneumonia which each contributed 21.4 percent of the deaths followed by Malaria which contributed 16.7 percent of the deaths and AID with 9.5 percent

The Chunya District has 24 health centers that provide preventive and curative services. Among them there is one (1) hospital which is the Chunya District Hospital, three (3) Health Centers which are all government owned and 21 Dispensaries out of which 20 are Government owned and one (1) private owned. Tanzania health care system is organized into 4 levels; dispensary, health centre, district hospital and referral hospital in increasing orders of the population served.

The health sector in the district is facing some challenges which include: low coverage of sanitary toilets in health facilities, inadequate availability of medicines, low acceptance rate family planning, inadequate human resources for Health, medical supplies and equipment, prevalence of HIV and AIDS, inadequate laboratory services, in adequate health management information system, prevalence of malnutrition in the community, shortage of health facility infrastructures, low liquid and solid waste management, increase in maternal Mortality rate, low enrolment of iCHF, high prevalence of communicable and non-communicable disease. The rate of change of peoples' attitudes is very low despite the fact that HIV/AIDS education and other measures have been taken against the HIV/AIDS prevalence.

**(ii) Education sector**

Igundu Village is served with one public primary school, this institution is Government owned. It is mixed (Contain both Boys and Girls) Primary School. Mbeya Region has good education infrastructure as well as good performance in education sector. Table 4.10 – 4.11 shows the total enrolment by sex in Government and Non-Government Pre-Primary, Primary and Secondary Schools in Mbeya Region, 2021. Generally, the Mbeya region is served with a wide range of education facilities ranging from pre-school services to vocational colleges. There are many tertiary education institutions on business management, wildlife management etc. Mbeya region is among the few regions in the country with good schools.

**Table 4.10: Number of Standard I-VII Pupils Enrolled in Government and Non-Government Primary Schools by Sex in Mbeya Region, 2023**

Council	Grand Total		Total
	Male	Female	
Busokelo	10,080	9,737	19,817
Chunya	24,994	25,491	50,485
Kyela	25,441	25,326	50,767
Mbarali	35,850	36,378	72,228
Mbeya	38,286	39,358	77,644
Mbeya CC	46,066	47,333	93,399
Rungwe	25,187	25,563	50,750
<b>Total</b>	<b>205,904</b>	<b>209,186</b>	<b>415,090</b>

Source: President's Office - Regional Administration and Local Government, 2023

**Table 4.11: Number of Students and Teachers in Government and Non-Government Secondary Schools in Mbeya Region, 2023**

Council	Number of Students			Total Teachers			Qualified Teachers		
	M	F	T	M	F	T	M	F	T
Busokelo	5,034	5,420	10,454	326	87	413	326	87	413
Chunya	4,495	5,477	9,972	215	83	298	215	83	298

Kyela	9,063	9,663	18,726	581	242	823	576	242	818
Mbarali	8,775	11,050	19,825	504	206	710	501	206	707
Mbeya	11,640	13,967	25,607	860	362	1,222	859	362	1,221
Mbeya CC	19,029	21,541	40,570	1,088	760	1,848	1,078	758	1,836
Rungwe	11,136	12,274	23,410	816	391	1,207	816	391	1,207
<b>Total</b>	<b>69,172</b>	<b>79,392</b>	<b>148,564</b>	<b>4,390</b>	<b>2,131</b>	<b>6,521</b>	<b>4,371</b>	<b>2,129</b>	<b>6,500</b>

Source: President's Office - Regional Administration and Local Government, 2023

### ***(iii) Water and sanitation***

The source of water to the community within the project area is boreholes, and shallow well. Water in the village is collected directly from constructed wells and streams during the rainy season, and shallow wells and hand dug wells in the valleys during the dry season. In Chunya District Council there are 39 boreholes, 12 shallow wells, 5 spring and 2 piped schemes, 2 charcoal dam, one permanent dam and one rain water harvest tank working as a source of water in rural area. The district has established 21 water user groups with a total of 19 Water User Groups (WUGs) of which 18 are active and operating and only 1 is inactive and dominant. Kiwanja division has 15 groups of which 13 are active and operating while Kipembawe division has 6 groups with 5 active and operating WUGs and 1 inactive and dormant water user group. Moreover, the findings show that water user groups have contributed about 22 million of which Kiwanja division has contributed 20 million and Kipembawe division contributed smallest share of about 2 million (CDC, 2022).

Sanitation in the project area is a priority due to challenges like inadequate sanitary facilities which leads to unhygienic waste disposal in some areas. Many households reported to have latrines, however most of them are unimproved pit latrines that do not meet basic sanitary standards. Chronic water shortages force some residents in the project area, to rely on unsafe water sources. This contributes to the spread of diseases like cholera and diarrhea. There are ongoing efforts to improve the situation through government projects, including drilling wells and building water supply systems. For example, as of April 2025, 23 wells were drilled across 19 villages in Chunya District, improving water access and reducing its cost for residents (RUWASA, 2025). The government is investing in water supply to address scarcity and is promoting hygiene practices through education and awareness campaigns to improve sanitation and reduce waterborne diseases.

### **Project Context and Implications**

This baseline establishes critical pre-existing vulnerabilities that directly inform the project's environmental and social risk management. The project's activities must be designed to avoid exacerbating these conditions and should seek opportunities for positive engagement.

- i. **Increased Demand & Cumulative Pressure:** The project's construction and operational phases will introduce a temporary workforce, increasing local demand for water and sanitation services. This could exacerbate existing shortages and strain community infrastructure, particularly during the dry season.
- ii. **Potable Water for Workers:** The project has a direct duty of care to ensure safe, potable water and adequate sanitation (e.g., improved latrines, handwashing stations) for all workers, both on-site and in any temporary labour camps, adhering to ESS2 (Labour) and ESS4 (Community Health).
- iii. **Community Water Access Risk:** Without careful management, project water use (e.g., for dust suppression, construction, or ore processing) could negatively impact the yield or quality of nearby community boreholes and shallow wells. A Water Management Plan are required to avoid and mitigate this risk (ESS3).
- iv. **Opportunity for Positive Engagement:** The project may align with ongoing government and RUWASA efforts (e.g., the drilling of 23 new wells) by engaging with active WUGs.

Strategies could include co-investment in local water point rehabilitation, supporting hygiene promotion campaigns, or contributing to community-managed water reserves as part of its stakeholder engagement plan (ESS10). This proactive approach would help mitigate project-related pressures and build positive community relations.

- v. **Public Health Mitigation:** The baseline prevalence of waterborne diseases necessitates that the project's Health and Safety Plans include specific measures to prevent the introduction or aggravation of health risks within worker and host communities (ESS4).

**(iv) Safety and Security**

Security measures available within the villages include security and safety committees, such as Mgambo and Sungusungu committees, as well as committee of culture and tradition, which has a role of containing the crime and upholding norms and values in their villages. The nearby police services are at Matundasi where there is also Ward Office.

**4.6.7 Labour and working condition**

The Mining (Safety, Occupational Health and Environment Protection) Regulations, 2010, provides that no holder of a Primary Mining Licence shall allow children below the age of 16 to be employed or engaged in any mining or processing operations in his primary mining licence area. Further the Employment and Labour Relation Act, 2004 covers prohibition of child labour (minimum age-14 years' old), forced labour, equal opportunity and eliminating discrimination, freedom of association, good working condition (such as hours of work, paid leave). Tanzania ratified the ILO Convention No. 182, known in short as the Worst Forms of Child Labour Convention (see section 3.7.4) on 12:09:2001. However, Child labour in Tanzania continues to affect an estimated 4.2 million children aged 5–17 years old, about 29 percent of this age group as reported in 2014 (ILO, 2018) (Table 4.12). The progress against preventing child labour in Tanzania has been very slow and the estimates provided excludes the worst forms of child labour covering sexual exploitation and child slavery. The majority of children in child labour have been identified in family-based agriculture. Nearly 95 percent of children in child labour are in the agricultural sector and nearly 93 percent are unremunerated according to ILO 2018.

**Table 4.12 Child labour in Tanzania**

	Children in child labour (in employment) % (5-11 years)	Children in child labour (in employment) % (12-13 years)	Children in child labour (5-13 years)	Total children in child labour %	Total children in child labour (numbers)
Male	22	37	25	29	2,212,338
Female	21	34	24	28	2,018,581
Urban	27	17	11	14	673,630
Rural	22	44	31	35	3,557,289
Total		36	25	28	4,230,919

Source: Based on Tanzania Integrated Labour Force Survey (ILFS), 2014.

According to the World Bank 2021 based on ILOSTAT database, the number of people in forced labour has dramatically increased in Tanzania from approximately 20 million in 2009 to 28 million in 2020. In the general project area, the majority of local people work in agriculture industry and some have petty businesses. The project proponent shall enter into a contract with all workers and follow the remuneration policy as developed by the NEMC.

#### 4.6.8 Gender and related GBV issues

Gender empowerment has become a significant topic of discussion in regard to social economic development. Entire district, businesses, communities, and groups can benefit from the implementation of programs and policies that adopt the notion of women empowerment. Empowerment is one of the main procedural concerns when addressing economic, socio-cultural and political life. Not only in Chunya District Council but also in Tanzania is at large, where the gender gap and inequalities in various spheres of life have been reported to decline in recent years due to establishment and implementation of various initiatives such as policy, legal and institutional reforms, and introduction of the National Action Plan for Violence against Women and Children (NAPVWC). According to 2018 statistics from the Human Development Report Office (HDRO) of the United Nations Development Program (UNDP), Tanzania falls into the third category of the Gender Development Index (GDI) with a score of 0.936. This implies that the country has a moderate deviation from gender parity on constituent metrics cutting across health, education and command over economic resources.

In Tanzania gender-based violence (GBV) is a key gender related issue and Gender-based violence remains a pervasive problem in Tanzania. GBV has a greater impact on women and girls, as they are most of often the survivors and suffer of great physical damage than men when victimized (Odunga, 2021). GBV results from gender norms and social and economic inequities that give privilege to men over women. The World Bank gender assessment report (2022) provide that 40% of women ages 15-49 have experienced physical violence at some point, 22 percent have experienced physical violence in the last year and 17 percent have experienced sexual violence. Sexual and physical abuse is even higher among married women. Violence against children is also prevalent whereby nearly 75% of girls and boys experience physical violence by the age of 18, and 30% of girls' experience sexual violence before adulthood. The Government of Tanzania developed the NPA-VAWC, 2017/18-2021/22 to reinforce its commitment to eliminating violence against women and children. The plan incorporates strategies to help local authorities and police, service providers, and communities better provide prevention and response services that have the greatest potential for reducing violence against women and children. To put the plan in action, the project proponent should collaborate with relevant government officials, social welfare officers, religious leaders, and police officers during implementation of the proposed project to end existing Violence against Women and Children.

In the 2008, the Police Gender and Children's Desks was established in the Mbeya region, to encourage increased reporting on sensitive issues related to gender, including sexual violence and rape. Today, Police Gender and Children's Desks at district level provide a secure and discreet setting for survivors to report incidences of sexual violence. Officers working at the gender desks are also closely linked to healthcare teams and social service sectors to maximize efficiencies and ensure survivors receive timely care. When visiting police gender desks, children who have experienced sexual violence are accompanied by a supporter and undergo a physical exam where they are tested for STIs and HIV. If the child is over 12 years old and brought in within 72 hours of the incident, they are given PEP (post-exposure prophylaxis), as a preventative measure to protect against HIV.

Also, at the district level there is a Department of Community Development, Social Welfare and Youth. The department has a role for raising awareness for development activities for the purpose of eradicating poverty and improving livelihood. The Department also facilitates programmes to improve local livelihood as well as sustaining the welfare of women, youth and children, vulnerable groups as well as wider community.

Stakeholders consulted including the Promoters of Health and Development Association (PHEDEA) and Chunya District Community Development, Social Welfare and Youth pointed out the most generic GBV

cases in the project area to be domestic violence (spouse beating), sexual harassment and exploitation, physical violence and psychological or sexual harm to those in the relationship. They are exhibited too in the construction sector whereby co-workers or construction supervisors are gender stereotypes. The main causes of these GBV are cultural norms and early child marriages; lack of education and knowledge on issues related to GBV; cultural norms in the community, the victims fear to report GBV cases and ending up to articulate/resolve issues in traditional way; high poverty levels, high use of drugs special local beers, the inferior beliefs in witchcraft; beliefs of children are source of wealth in the communities, they conceive a lot of children leading to high poverty levels and lack of parenting skills. It was provided further that early or forced marriages increased due to labour influx, which tempt young girls, employing beautiful girls in commercial/petty trades attract males for food and sex, commercial or survival sex, sodomy and rape, are commonly available in the project area. The most common form of gender-based violence in the area associated with work is sexual harassment. It was reported that women and girls experience more sexual harassment at the workplace than males. Sexual harassment is an offensive conduct of a sexual nature that make workers feel humiliated, intimidated or uncomfortable. It is a violation of workers' rights. Sexual harassment creates a climate of fear and physical and mental ill health; workers may have to take sick leave or at worst are forced to leave their jobs.

## **5.0 STAKEHOLDER ANALYSIS**

### **5.1 INTRODUCTION**

The objective of stakeholder consultations for the proposed construction of the ASGM Gold Ores Processing and Washing Facilities at Itumbi Mlimani area in Itumbi Village was to identify and involve key stakeholders in the environmental assessment process. The integration of public participation/involvement of stakeholders in the environmental assessment process is essential in terms of its implication for sound decision making, the sustainability of development activities and form part of best practice. Accordingly, the Environmental Management Act cap 191 and Environmental Management (EIA and Audit) (Amendment) Regulations, 2018 both documents provided procedures for the involvement of stakeholders and the public in the environmental assessment process and review of proposed undertakings. The Stakeholders Engagement Plan (SEP) for the Environmental Health and Pollution Management Project (EHPMP) was developed early to define a program for stakeholder engagement, including public information disclosure and consultation, throughout the entire project cycle. The SEP outlines the ways in which NEMC (project team) will communicate with stakeholders and includes a mechanism by which people can raise concerns, provide feedback, or make complaints about EHPMP project and any activities related to the project. The SEP stressed that involvement of the local population is essential to the success of the project(s) in order to ensure smooth collaboration between project staff and local communities and to minimize and mitigate environmental and social risks related to the proposed project activities.

With respect to the proposed project at Itumbi area, the process afforded opportunity to the stakeholders to express their views and concerns in order to be included in the environmental assessment. The Consultants informed the local people, leaders, and key stakeholders about the proposed project through consultative meetings, key informant interviews, email communication, public meetings, and telephone calls. During the consultation process, the stakeholders were taken through the proposed project, including its objectives, implementation technologies, and possible impacts of the project's implementation. Stakeholders were then given time to ask relevant questions regarding the proposed project to enable the consultants to clarify any issues they may not have adequately understood.

Further during the meetings, the team had a chance to conduct Focused Group Discussion (FGD). The FGDs were mostly conducted in the villages (closest to the project) to discuss various issues related to the project and potential positive and negative impacts. The FGDs were conducted separately considering gender, activities and project interests to allow free expression since some of the topics targeted a specific group because of socially constructed norms. FGD was led by a qualified sociology expert and particular questions concerning issues of employment opportunities, health and safety, GBV issues, risks, and advantages of the project were discussed.

### **5.2 GOAL OF THE CONSULTATION PROCESS**

The overall goal of the consultation process is to disseminate project information and to incorporate the views in the design of the mitigation measures and environmental management plan. It is done to ensure the quality, comprehensiveness, and effectiveness of the impact assessment to ensure that various groups' views are adequately considered in the decision-making process to avoid conflict at a later stage. Consultation with the stakeholders was aimed at positively conveying information about the proposed project development, clearing up misunderstandings, allowing a better understanding of relevant issues.

Also, how they will be dealt with, and identifying and dealing with controversial areas to clarify matters and make adjustments accordingly while the project is still in its design stage. Stakeholders and public involvement were therefore aimed at assisting the Consultant in:

- i) Improving project design and, thereby, minimize conflicts and delays in implementation;
- ii) Determining the scope of the environmental assessment.
- iii) Deriving specialist knowledge about the site.
- iv) Clarifying any misconceptions, misunderstandings, myths and the like, that may have arisen from misinformation about the project or local species beliefs
- v) Facilitating the development of appropriate and acceptable entitlement options;
- vi) Increasing long term project sustainability and ownership;
- vii) Reducing problems of institutional coordination; and
- viii) Gathering the information needed to complete the assessment

### 5.3 THE STAKEHOLDERS IDENTIFIED

The ESIA study benefited from extensive stakeholder consultations with a broad cross-section of the community. A stakeholder analysis was used to identify stakeholders that should be involved in the environmental assessment process. Their relevance informed the basis of inclusion of these in terms of their activities within the area and whether they are residents of the area. The Stakeholders were categorized into two groups for this study. The first group consisted of institutional stakeholders and the second consisted of community stakeholders. The institutional stakeholders were drawn from government ministries and departments and various agencies with roles within the project area. On the other hand, community stakeholders were community representatives drawn from various community governance structures within the project area. Details about the stakeholders consulted (name of organization, person contacted, etc.) are presented in table 5.1 below and signatures are presented as appendix 3:

**Table 5.1: List of Stakeholders Consulted**

Level	Stakeholders	Person Contacted
Central Government: Ministries, Departments and Agency	Ministry of Minerals (Resident Mines Offices (RMOs))	Eng. Sabai I. Nyansiri, (Resident Mines Officer at Mbeya region)
	Ministry of Water (Lake Rukwa Basin Water Board-Director office)	Ms. Siya Julius Mamiro (Basin Environmental Management officer)
	Occupational Safety and Health Authority (Southern Highland Zonal office)	Mr. Faston Uswege (Zonal Manager) Dr. Rajab Mambo
	Government Chemist Laboratory Authority (GCLA) Southern Highland Zonal office	Mr. Elias Z. Mulima (Zonal Manager)
	Mbeya Regional Miners Association (MBEREMA)	Mr. Leonard Manyesha (Chairperson of Mbeya Regional Miners Association)
	Project Proponent)	Dr. Befrina Igulu (Project Coordinator)
Regional Authorities	Regional Secretariat	

Chunya District Authorities	Chunya District Executive Director Office	Mr. Tarim H. Kambona District (Executive Director) Mr. Yohana Ngulukia (Senior Environmental Management officer)
Matundasi Ward Authorities	Ward Development Committee (represented by the Ward Executive Officer)	Mr. Mashaka A. Mwanjunga (WEO)
Itumbi Village Authorities	(Chairman, VEO, Environment Committee); Other leaders (religious, teachers, traditional chiefs, elders, etc)	Mr. Benard Aron (Ag. Chairman), Ms. Aneth Jerard (Ag. VEO)
	Other village members	Elyud William, Judith Sanga, Mambo Lucas, Lucas Ngamba, Kasian Alphonse Semiono, Mohamed P. Senga, Evastina A. Mbolwa, etc.
Private organizations	Other operators within the PML	Philipo sebastian
Other Stakeholders	GBV-related issues	Inspector Maligembe Juma Kamata (Ward police officer)

## 5.4 STAKEHOLDERS AND PUBLIC CONCERNS

The ESIA study has identified the main concerns and issues raised by the different stakeholders. Generally, stakeholders were supportive for the project due to its relevance as Mercury is widely used and preferred than other methods for gold ores processing. Hence its safer use to protect ones health and surrounding environment was positively conceived. A detailed list of the stakeholder's concerns is provided in Appendix 4. Based on the raised concerns, a summary of issues raised are provided below:

### 5.4.1 Reduce the effects of mercury on the environment

In Chunya District, every artisanal and small-scale gold miner use mercury for gold recovery anywhere, even at home, because it is difficult for small miners to process gold at one place due to financial implications. The stakeholder provided that the Artisanal Small-scale gold miners are not aware on the health effects related with mercury use, therefore, sensitization and provision of safer way of using mercury is very much needed. They added that introduction of gold processing and washing bay as demonstration Centre that use mercury safely, will reduce the effects of mercury on the environment.

### 5.4.2 Employment opportunities

Stakeholders at local level advised for the contractor to be engaged should give priority to local community on employment opportunities especially to the jobs that does not require a very specialized skill.

### 5.4.3 Water Pollution

It was advised washing resultants effluents should have proper management like containment ponds to avoid direct discharge to the open environment. Stakeholders advised to have regular monitoring of the key parameters with a purpose to ensure the operation does not impact the surrounding environment. It was reminded for the facility to be station away from the water course/body to create enough buffer and hence reduce risks for water pollution.

#### **5.4.4 Land issues**

It was noted that land issues in the mining sector have not been a major issue as normally there is mutual understanding between miners and land owners while for village land the procedure is that 30% of the income is allocated to the village for development activities and 70% remains with the producer-operator and the owner of the production facilities and this is after all government royalties have been deducted from each gold quantity that is produced.

The owner of the PML where the facility will be constructed also confirmed to the team that there is no land related issue at the site and there is a document in place for surface land use from the village government. Also, it was noted that the area of Itumbi Mlimani is officially recognized as an area for artisanal and small-scale miners and thus there is no land related issue.

#### **5.4.5 GBV Issues**

Stakeholders noted the prevalence of GBV issues in the area including in the mining sector within the district. The common GBV issues noted include child engagement to mining activities that lead to drop out from schools, sexual harassment, child neglects, raping of children, couple physical violence, and early pregnancies. Also, it was noted there is a mechanism in place to deal with GBV issues right from Ward level where there is a GBV committee and ward police officer to link with the GBV Desk at the police station. The committee meets on monthly basis and constitutes village executive officers of each village within the ward.

#### **5.4.6 Stakeholders involvement**

It was advised for the project to corporation with all key stakeholders during implementation of the project to ensure project acceptance and hence to achieve its intended objectives and outcome. The stakeholders noted for corporations include the district director's office and small-scale miners with their established associations such as REMAS.

#### **5.4.7 Decommissioning of the facility**

Stakeholders reminded that upon decommissioning the area should be restored close to its original conditions. It was also noted that, the fate of the stockpiled materials and tailing storage facilities should be well defined on how they will be decommissioned.

#### **5.4.8 Public safety**

The operation area should be fenced to avoid interactions with other human activities for public safety. Most of the small-scale mining areas are also grazed and sometimes livestock drinks the water on the storage ponds from gold ore processing because there is no fence to separate mining operations with other human activities.

#### **5.4.9 Modality of operation of the facility**

It was noted that, in order to avoid misunderstanding between PML owner where the facilities will be located and small-scale miners it should be clearly defined and known from the onset of the project on the operation model that will be used to run the proposed project. The common understanding among key beneficiaries on the model to run the facility will create a sense of acceptance and ownership that

will lead to achievement of the project outcomes. The noted issues to be understood include the running costs of the facility (how much/who should bear), the fate of semi processed tailings belonging/ownership, the ownership of the facility after ending of the project and its sustainability.

#### 5.4.10 Compliance issues

Stakeholders noted that the project will assist small scale miners in terms of compliance to OHS and environmental issues during their activities on how best it can be done. This will also assist regulators especially the Mines inspectors to enforce the compliance as there will be vivid example to refer for total compliance.

#### 5.4.11 Legal and procedural aspects

There are a number of legal and procedural aspects that have been realized in the course of stakeholders engagement and in particular with government agencies/authorities. Before starting construction the project proponent/contractor will require to liaise with the Occupational health and safety Authority for approval of the drawings on OHS aspects, registration of work permit and adherence of OHS aspects in the course of project implementation, Lake Rukwa Basin Water Board for obtaining borehole permit for both monitoring boreholes and water use boreholes, also to liaise with Ministry of Water – Dam Safety section to obtain a permit for construction of Tailing Storage area.

### 5.5 ADDRESSING THE STAKEHOLDERS' CONCERNS

The study has provided a variety of views and opinions on what are considered to be the main concerns and issues of different stakeholders. Based on the raised issues/concerns, an analysis was carried out and recommendations were given for those issues that required attention in the study. The recommendations are covered in the mitigation chapter of this document as indicated in chapter 7. Other chapters also provide some good clarifications on the issues raised. Table 5.2 shows the response table with specific sections where the issue is addressed.

**Table 5.2: ESIA recommendations for issues raised by stakeholders**

<b>Issues</b>	<b>ESIA Recommendation(s)</b>
Water pollution	6.3.2, 7.3.1
Land issues	2.5,
GBV issues	6.2.15, 7.2.15,
Decommissioning of the facilities	6.4.2, 7.4.2, 7.3.1 & Chapter 11
Public safety	2.8.5, 6.2.4,
Modality of operation of the facility	2.7.5.1
Legal and procedural aspects	Chapter 3
Employment opportunities	6.2.17, 6.3.10,

## 6 ASSESSMENTS OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

### 6.1 ASSESSMENT METHODOLOGY

This section of the report assesses the significance of the environmental and social impacts that have been identified by the specialists that formed part of the team which conducted the environmental and social impact assessment. The team members conducted literature reviews of available information related to the site conditions and concerning similar project operations before visiting the site. During the site visit, the team spent the time -site gathering information, including gathering samples for identification at their offices. The combined site visits by all specialists assisted in integrating ideas and findings between the specialists. The team undertook a social survey by conducting interviews with a broad spectrum of community members. The role of each specialist was to collect sufficient data to assess the environmental and social impacts. To achieve this, the team used a standard Leopold matrix (Leopold et al., 1971), which is the best-known matrix methodology available for predicting the impact of a project on the environment. The matrix takes into account impacts on the physical environment (e.g., air quality, soil and ground water quality), the ecology (e.g., flora and fauna) and on human socio-economic settings, as shown in table 6.1. The matrix establishes the relationship between project components and elements of the environment. All impacts identified and described were assessed by a grid evaluation of impact significance based on intensity criteria (including the value), scope and duration.

The intensity of the impact refers to the magnitude of changes disrupting the integrity, function and usage of each component of the environment affected by the project. Its assessment in the context of this project reflects the ecological context or social environment concerned and enhancement of the component. The intensity of the negative impact can be high, medium or low. It is strong when the impact destroys the component, calls into question his integrity or results in a major change in its general distribution or use in the middle. The intensity is moderate when the impact changes the component affected, without jeopardizing its integrity or its use entails a limited modification of its general distribution in the middle. Finally, the intensity is low when the low impact component alters but does not really alter its quality, its general distribution or use in the middle.

The second criterion for assessing impact is the extent that refers to the area affected and the portion of the population affected, it may be regional or local basis. The scope is regional impact if a component is felt throughout a large area or affects a large portion of its population: it is the case in this study of the study area enlarged. The scope is local if an impact on a component is felt over a limited portion of the study area or its population that is in the case of this study to the detailed study area. The extension is timely if an impact on a component is felt in a confined space or limited by some people: that is the limited study area.

The final criterion is the term that refers to the period during which the effects will be felt in the middle. The duration of an impact can be long, medium, short. The time is long when the impact is felt continuously or intermittently over a period exceeding five years or longer than the life cycle of a species. This is often an impact permanent and irreversible. The duration is average / medium when the impact is felt temporarily, continuously or intermittently, during phases of construction or operation. This impacts the duration of which exceeds one year but less than five years, or do not exceed the duration of the life cycle of a species. This type of impact could be reversible. The duration is short when the impact is felt temporarily, continuously or intermittently, during phases of construction or operation. These impacts, the duration of which varies from several days to several months, or during a short part of the life cycle of a species. This type of impact could be reversible. These criteria are grouped in a grid and serve to clarify

the importance of the impact of a project activity on a given component. For each type, the prediction and analysis of the impacts were made on the basis of biophysical characteristics of settlement areas on the one hand and the nature of the activities included in the project. For purposes of this study impacts on the environment, different stages of the project to be considered are: site selection, design phase, mobilization phase, construction and management and operational phase.

**Table 6.1: Matrix of impact identification**

Project Activity	Physical environment		Ecological environment			Socio-economic setting		
	e.g., Air quality	Fresh water quality	Flora	Fauna	Other ecosystem components	Social	Economic	Cultural
Site Selection Phase								
Activity 1								
Activity 2								
etc.								
Design Phase								
Activity etc								
Mobilization Phase etc...								

### 6.1.1 Environmental and Social Impact Rating Scale

A standard assessment methodology was used to assess the significance (the importance of the impact in the overall context of the affected system) of the identified impacts to ensure a direct comparison between various team studies. The criteria that were considered in the determination of the impact significance are:

- i) Severity/Benefit: the importance of the impact from a purely technical perspective;
- ii) Spatial scale: extent or magnitude of the impact (the area that will be affected by the impact);
- iii) Temporal scale: how long the impact will be felt;
- iv) Degree of certainty: the degree of confidence in the prediction;
- v) Likelihood: an indication of the risk or chance of an impact taking place;

To ensure integration of Environmental and social impacts, to facilitate specialist assessment of impact significance, and to reduce reliance on value judgments, the severity of the impact within the scientific field in which it takes place (e.g., vegetation, fauna) was assessed first. After that, each impact was assessed within the context of time and space, and the degree of certainty in the prediction was indicated. The impact was then assessed in the context of the whole environment to establish the “significance” of the impact. This assessment incorporates all social, cultural, historical, economic, political and ecological aspects of the impact. Thus, the severity or benefit of an impact within a specialist discipline was first assessed before the significance of the impact was evaluated in a broader context. Consequently, two rating scales were required, one to determine the severity or benefit and one to determine environmental and social significance.

### 6.1.2 Severity/benefit

Severity is based on the professional judgement of the various specialists to evaluate the extent to which negative impacts would change the current conditions, or how beneficial positive impacts would be on a particular affected system (for environmental impacts) or a particular affected party (for social impacts). The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious

the impact is when nothing is done about it. The word mitigation means not just “compensation”, but also ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. Mitigation or optimization must be practical, technically feasible and economically viable.

## **6.2 MOBILIZATION/CONSTRUCTION PHASE**

### **6.2.1 Loss of /disturbance of biodiversity (flora, fauna and ecosystem)**

As described in previous chapters development phase will involve site clearance associated with the removal of existing vegetation cover. Main potential impact is loss of biodiversity in terms of flora and the habitat for some species and thus loss of fauna also. As stated in previous chapters the vegetation on the proposed project area is of miombo woodland with few species of *Brachystegia spiciformis*, *Brachystegia boehmii*, and *Julbernardia globiflora* bushes and grasses and thus the loss will be few plant species due to small size of the project site (70meters x 70 meters) which are also present in the surrounding areas. Thus, the cleared area will be specific to the project area, which is relatively small compared to the vegetation cover of the entire project area. Furthermore, the few species to be lost are not enlisted in the CITES/IUCN list of species requiring special conservation status i.e., endangered, rare or endemic. Clearance in this regard will not result in the loss of vegetation/biodiversity of significant value. *The impact is considered negative, long term and of low significance.*

### **6.2.2 Accelerated soil erosion**

The removal of vegetation will cause the land to be bare temporarily and hence prone to agent of soil erosion such as wind and moving water and hence accelerated soil erosion. Based on the site condition as noted in previous chapters the site is almost flat and hence the likelihood of excessive soil erosion is minimal. Furthermore, all the areas that will be cleared or excavated will be covered by either structure or hard-cored and landscaped to reduce the risk of long-term erosion. *The impact is predicted to be negative, short term and of low significance.*

### **6.2.3 Noise pollution**

During the mobilization and construction stages of the project, noise will be generated from on-site activities and the operation of construction equipment, which may affect nearby receptors as well as construction workers. Noise emissions will mainly arise from the use of machinery and vehicles such as excavators, concrete mixers, and trucks. Noise is measured in decibels (dBA) and is considered a nuisance when the combined expected maximum noise level exceeds 70 dBA and is at least 1.0 dBA above the prevailing background noise level.

The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations, 2015, stipulate maximum permissible daytime noise levels of 70 dBA for industrial areas and 60 dBA for residential and mixed-use areas, including small-scale production and commercial zones. In addition, WHO and IFC guidelines recommend that noise levels within working areas should not exceed 70 dBA. The project will adhere to these standards throughout the construction phase.

**Table 6.2: Maximum Permissible Noise levels for general environment**

FACILITY	NOISE LIMITS in dBA (L <sub>eq</sub> )	
	DAY	NIGHT
Any building used as hospital, convalescence home, home for the aged, sanatorium, & learning institutions, conference rooms, public library, environmental and recreational site.	45	35
Residential building	50	35
Mixed residential (with some commercial and entertainment)	55	45
Residential and Industry/small scale production and commerce	60	50
Industrial area	70	60
TIME FRAME	6:00 am -10:00 pm	10:00 pm-6:00 am

Source: Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations, 2015

However, the size of the construction to be involved shows that relatively few equipment and trucks will be involved in transporting the construction materials. Furthermore, there is no sensitive receptors (residential or school) nearby the project site. As noted earlier the nearest to the project site is the central area for processing gold ores under the PML owner. Compared with the usual background noise levels at the mining area, which was ranging from 41 dBA to 53 dBA as per spot measurement done (section 4.3.5), the additional noise levels may exceed the background noise level at a distance of 100 meters from the construction site. Albeit annoying, this negative impact will be of short-term effects restricted to working time, mainly around the proposed construction area and is not considered a significant threat to the public health rather than onsite personnel the aspect of which is separately covered under occupational health and safety. *The potential impact is predicted to be negative, short term, cumulative, and low significance.*

#### **6.2.4 Air pollution due to dust emission**

During construction work, a concrete batching plant or mixing equipment will be used and such plant/equipment has the potential to emit dust in the form of cement, sand and aggregates dust. Dust is also likely to occur during the transportation of construction materials in trucks due to untarmac road conditions. Also, if the trucks containing materials like sand or gravel are not covered, fine materials may be blown by the wind and scattered all the way. Any quantity of dust emissions will potentially impact the air environment and affect sensitive receptors in the proximity areas, such as the site workers, users of the nearby road, and nearby residents and community centers. Dust also has the potential to settle on nearby project structures and landscaped grounds. Given the scale of the project and the location of the project site which is isolated from sensitive receptors air pollution from dust emission is not expected to cause public health concerns in the area. However, however this might be an issue with site workers, which is addressed under OHS hazards. *Therefore, the impact of air pollution due to dust is predicted to be of short-term duration, cumulative and of low significance.*

#### **6.2.5 Air pollution from noxious gas emission**

Construction materials such as cement, steel, wood, sand, stones, aggregates, etc. will be brought from different sources in Chunya District and Mbeya Region. Transportation is inevitable from point source to the project site. The trucks and earth moving equipment will inevitably emit exhaust fumes (containing SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, hydrocarbons and particulate matters), which are unwanted atmospheric pollutants. Likewise, during construction, vehicles and equipment with internal combustion engines will emit noxious

gases such as CO<sub>2</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub>, VOC, and CH<sub>4</sub>. Emission levels, however, is a functioning of speed, condition of the road, application etc. The main impact is impairment of local air quality, which will depend on: the number of vehicles operating at a particular time; prevailing atmospheric conditions - wind regime, temperature and rainfall; atmospheric conditions and duration of construction work. The general guidelines for air quality standards for Tanzania and as recommended by the World Health Organization (WHO) are listed in Table 6.3 below:

**Table 6.3: Air quality standards**

Pollutant	Tanzania		WHO Ambient Air Quality Guidelines		
	Averaging period	Average value in $\mu\text{g}/\text{Nm}^3$	Averaging period	Average value in $\text{mg}/\text{m}^3$	
SO <sub>2</sub>	• Hour average	100 $\mu\text{g}/\text{Nm}^3$	24-hour	125 (Interim target-1)	
	• Annual mean	40–60 $\mu\text{g}/\text{Nm}^3$		50 (Interim target-2)	
			10 Minutes	20 (guideline)	
NO <sub>2</sub>	24-hours	150 $\mu\text{g}/\text{Nm}^3$	1-year	500 (guideline)	
	8 hours	120 $\mu\text{g}/\text{Nm}^3$	1-hour	40 (guideline)	
PM <sub>10</sub>	Annual mean	60 to 90 $\mu\text{g}/\text{Nm}^3$	1-year	200 (guideline)	
				70 (Interim target-1)	
				50 (Interim target-2)	
				30 (Interim target-3)	
	24-hour				20 (guideline)
					150 (Interim target-1)
					100 (Interim target-2)
					75 (Interim target-3)
Ozone	8 – hours average	120 $\mu\text{g}/\text{Nm}^3$	8-hour daily maximum	50 (guideline)	
	Annual mean	10–100 $\mu\text{g}/\text{Nm}^3$		160 (Interim target-1)	
CO	Time-weighted exposures at the following levels:			100 (guideline)	
				• 15 minutes	• 100 $\text{mg}/\text{Nm}^3$
				• 30 minutes	• 60 $\text{mg}/\text{Nm}^3$
				• 60 minutes	• 30 $\text{mg}/\text{Nm}^3$
				• 8 hours	• 10 $\text{mg}/\text{Nm}^3$

It is expected that the number of vehicle movements during construction, equipment and machinery planned to be used will be limited due to scale of construction to be involved. With the low forecast number of vehicle movements, the limited quantity of equipment/machinery, and the adoption of good maintenance regimes, the emissions of air pollutants from these sources will be limited. Additionally, from the above standards and based on the location and duration of works on the project site, it is unlikely that the above threshold value will be exceeded. It can be concluded that the emissions may affect local air quality but will have no significant impact on global air quality. *The impact is predicted to be negative, cumulative, short-term duration, and low significance.*

### 6.2.6 Land degradation at point sources of construction materials

The proposed project will require standard construction materials including hardcore, bricks, building stones, ballast, cement, rough stones, sand and water. Extractions of construction materials from both

authorized borrow pits and quarries on government land, communal land, and private-owned land are associated with rampant degradation at source points with no efforts of restoration/re-vegetation. Most exploited borrow pits are found on private owned /communal land of natural vegetation or planted with crops that have been cleared/disturbed. Around the project area, there are no suitable bed-rock for ballast (gravel and sand) or suitable sand and thus will require to be obtained away from the area. Pollution risks include sediment overload into the stream during rains and oil contamination from excavators and loaders. In some instances, sand is extracted from riverbeds. Most of these areas are declared by the government as danger zones and exploitation is prohibited. Environmental impacts associated with the extraction of materials for the construction of the proposed project will be cumulative because resources extraction is open to all contractors/users. Thus, the project will be adding to existing problems. Thus, these impacts are predicted to be: *Secondary or indirect negative impacts, cumulative, short to medium-term and of moderate significance.*

### **6.2.7 Pollution of land and water resources from hydrocarbons leaks and spills**

During the construction phase, vehicles and construction machinery will operate on site, and limited refuelling and routine maintenance activities may take place within the project area. Fuel and lubricants may also be temporarily stored on site to support construction activities. These activities present a risk of accidental hydrocarbon spills, which could contaminate soil and surface water if not properly managed. Hydrocarbon products contain substances that are potentially harmful to the environment if released uncontrolled.

Although the likelihood of significant spills at the project site is low, precautionary measures are necessary to prevent and manage minor leaks and spills, particularly during equipment maintenance and refuelling of vehicles and machinery. Given the limited number of vehicles and the relatively small quantities of fuel and lubricants involved, any potential impacts are expected to be localized, short-term, and of low significance, provided that appropriate handling and spill management practices are implemented.

### **6.2.8 Public health hazards due to construction waste**

The solid waste generated during site preparation and construction work would include cut vegetation and typical construction waste (e.g., wasted concrete, steel, wooden scaffolding and forms, bags, waste earth materials, timber, paper, plastics etc.). This waste would negatively impact the site and surrounding environment if not properly managed and disposed of at Chunya District dumpsite. Cleared vegetation burnt onsite would generate smoke, possibly impacting negatively on ambient air quality and human health. If allowed to accumulate in drainage ways, solid waste could cause pooling and flooding. Pooling of water, in turn, would create conditions conducive to the breeding of nuisance and health-threatening pests such as mosquitoes. *The impact is predicted to be negative, short term and of moderate significance.*

### **6.2.9 Environmental pollution from poor management of construction materials**

Construction materials will be bought and stored at the project site. The inappropriate siting of stockpiles and storage of sand, gravel, etc., at the construction site, could lead to fine materials being washed away during heavy rainfall events. Bearing the slope terrain of the area the materials might be washed towards lower grounds and to the receiving water body. During dry wind periods the inadvertent dispersal of materials could also happen. Wind disperses the dust carrying it away from the source. The wind generates dust by carrying away fine particles from material stockpiles and dry ground surfaces. This would cause waste of materials and contribute to turbidity and sedimentation with consequent negative

impacts on the environmental quality of the area. However due to relatively small-scale project the construction materials to be brought will also be small. Thus, unlikely for significant pollution due to mismanagement of the construction materials at site. *The impact is predicted to be negative, short-term duration, and low significance.*

### 6.2.10 Community health and safety risks

Community health and safety (CHS) considerations focus on the well-being and security of local populations during project development. This section describes the existing CHS context and identifies the primary pathways through which the project may interact with the community. The assessment of impact significance and residual risk will be detailed in the subsequent Impact Assessment chapter.

**Existing Community Health and Safety Context:** The project area shares the public health profile common to the region, with endemic challenges including waterborne diseases (e.g., cholera, typhoid) and vector-borne diseases such as malaria, as established in the water and sanitation baseline (Section X.X). Local healthcare infrastructure has limited capacity. The road network consists primarily of unpaved village roads used by pedestrians, livestock, and limited local vehicle traffic, establishing a baseline of low traffic volume and associated safety risks.

**Potential Project Interaction Pathways:** The introduction of project activities will create specific interfaces with this baseline. The key pathways requiring detailed assessment are:

- i. **Traffic and Transportation Safety:** The movement of project vehicles for transporting construction materials and equipment will increase traffic volume and change usage patterns on local roads shared with vulnerable users.
- ii. **Public Health Exposure:** The introduction of a project workforce creates a dynamic for potential disease transmission (airborne, waterborne, vector-borne, and sexually transmitted infections), which must be considered against the backdrop of endemic diseases and constrained local health services.
- iii. **Nuisance from Dust and Air Quality:** The transportation of uncovered materials on unpaved roads and general construction activity are potential sources of dust generation, posing a nuisance and air quality concern for nearby residences.
- iv. **Pressure on Local Services and Resources:** Increased use of local roads, water points, and commercial services by project personnel may place incidental strain on community infrastructure.
- v. **Social Dynamics and Security:** An influx of temporary workers can alter short-term social dynamics, with associated considerations for community security and local economies.

**Project-Specific Characteristics for Consideration:** The scale and design of the proposed project will influence the magnitude of interaction along these pathways. Relevant characteristics for the assessment include:

- i. A limited number of vehicles (e.g., 1-2 trucks) will be used for material transport.
- ii. A small, temporary construction workforce (approximately 20 people) is anticipated.
- iii. The workforce is expected to be sourced locally, with no dedicated construction camp required.
- iv. The operational phase will not require a new, external workforce.

### 6.2.11 Occupational health and safety hazards

Construction activities inherently involve risks of injuries and fatalities to workers due to the use of powered and sharp edged equipment. The project will involve various noise-emitting machinery, tools,

and equipment such as compressors and concrete mixers. Potential hazards to construction personnel may arise from moving machinery, dust, noise, and vibrations generated during excavation, transportation, and material handling activities.

Proper occupational health and safety measures will be implemented to minimize risks, including the provision of personal protective equipment (PPE), adherence to safe operating procedures, and training of personnel in hazard awareness and emergency response. With these measures in place, risks are expected to be manageable and of low to moderate significance

According to the OHS Act of 2003, causes of accidents in construction sites includes but are not limited to poor site layout; poor erection and improper use of scaffolds; falling objects from the high level; improper method of lifting; sharp edges; improper use of personal protective equipment PPE; inadequate provisions of Personal Protective Equipment PPE; falling through uncovered openings, especially at upper floor levels and carelessness of workers. *This impact is predicted to be negative, long-term, and of high significant.*

#### **6.2.12 Increased incidence of diseases transmission including HIV/AIDs and STDs**

During construction, about 30 workers will be involved at the project site. Some workers will come from other places apart from Matundasi Ward and Itumbi Village. This will result in social interactions and intermingling. In this case, social interactions cannot be avoided, resulting in the spread of HIV/AIDs and STDs. However, the construction of this project will only last for a few months, and about 30 construction workers are relatively small in the area. Thus, the expected interactions might be minimal. *The impact is predicted to be negative, long term but of moderate significance.*

#### **6.2.13 Potential risks and hazards associated with labour**

Due to high prevalence of child labour and forced labour in Tanzania there could potentially be impacts associated with lack of work contracts, long hours with no pay and children working at supplier's sites. The impact associated with forced labour and child labour would potentially be higher in supply chain due to complexity in regular monitoring of contracts and subcontractors. In particular workers in this construction contract works could be exploited due to breach of labour regulations and presence of informal jobs. The potential risk associated with forced labour and child labour is particularly high during construction stage due to involvement of many temporary contract jobs. The risks may include physical, and biological risks and hazards. These are associated with equipment damage and loss, absenteeism, loss of workers' productive time, treatment costs, and loss of livelihoods. *The impact is predicted to be negative, long term but of moderate significance.*

#### **6.2.14 Health and safety risks due to influx of construction workers**

There is a possibility of the project to attract people during construction and implementation phases because of employment expectations. Presence of the construction crews during project implementation could potentially create a source of social challenges as a result of interaction of local people with project workers in the area. The influx of people may result into potential social conflict between new workers and locals; potential use of alcohol and substance abuse among workers leading to anti-social behavior in the project area; pressure on existing infrastructure; increase of health risks (i.e., spread of diseases such as HIV/AIDs) and feel of unrest for local women as a result of 30 workers moving to the project area.

However, due to the nature of the project and the size, it is not expected that there will be large workforce required for the project. Approximately 30 workforces will be required during the construction period which is not a large number of people to cause significance impact. Further, the presence of construction workforce will be temporary and therefore the demographic effects are not expected to cause significant long-term impacts. Once construction is completed, many external workers and contractors will leave the project area. *The impact is predicted to be negative, long term but of low significance.*

#### **6.2.15 High prevalence of gender-based violence (GBV) in the project area**

Many forms of gender-based violence (GBV) are considered acceptable within communities, including physical abuse by a husband/partner and forced sex in a relationship. More than 20% of Tanzanian women aged 15–49 report having experienced sexual violence in their lifetime; nearly 40% have experienced physical violence. GBV is acknowledged as a key social issue within the mining sector in Chunya District. The proposed project is expected to employ about 30 workers, mainly men, during construction from local communities and other parts of Tanzania. There will be no campsite and this will lead the workers to be hosted in the nearby facilities. The potential gender common related impacts during the construction stage could be gender-based violence and harassment associated with interaction of local workforce with local women particularly when they are out of the project site. While project workers are away from their homes, these workers may exhibit inconsistent social behaviours that can potentially lead to sexual harassment of women and girls, exploitative sexual relations and illicit sexual relations with minors (individual below the age of 18 years) from the local community. Gender discrimination may limit women's access to resources, opportunities, and public services necessary to improve the standard of living for themselves and their families. As a result, the livelihoods of women affected by the project may be disproportionately impacted if not managed appropriately.

Further, the major economic activities in this area are mining operations and small retail business. The affordable place for the casual labourers to have their food is from Mama Lishe. In addition to the above, the proposed project will provide yet another avenue of social interaction between workers in the project and Mama Lishe who happen to be women. The potential social interactions between workers and local community could lead to social issues and conflicts. Some interactions may be of intimate nature resulting into contracting sexually transmitted diseases including HIV/AIDS and potentially other related illnesses like child neglect. *The impact is predicted to be negative, long term but of moderate significance.*

#### **6.2.16 Gender inequity in employment**

Gender inequality differs from one society to another depending on the culture, social and economic settings. It is quite common within the project area to take it for granted that men will naturally work outside the home and women could do it if and only if they could combine it with various in escapable and unequally shared household duties. This is sometimes called "division of labour," though women could be forgiven for seeing it as "accumulation of labour." The reach of this inequality includes not only unequal relations within the family, but also derivative inequalities in employment and recognition in the outside their households.

Due to this there is a potential risk that gender inequality might be perpetuated during project construction through unequal distribution of work, discrimination against women, and unequal pay for women, among others. Women are likely to be least favored in the employment opportunities in the project area. This is because the nature of jobs available during construction is perceived to be done mainly by men. *The impact is predicted to be negative, long term but of moderate significance.*

### 6.2.17 Employment opportunities

Site preparation activities and mobilization will create employment opportunities for residents in Igundu Village. Both skilled and unskilled workers will be employed to perform various activities such as site clearance, construction of materials storage yard, mobilization of machinery, site preparations, and materials movement. It is estimated that 50 personnel will be involved with the project structure development and recruitment of skilled labour is mostly of Contractor's choice. Employment opportunities are of benefit both economically and in a social sense. In the economic sense, abundant unskilled labour will be used in construction hence economic production. Food vendors who are mostly women will benefit by supplying food to the workforce. Other local suppliers adjacent to the project will have additional income-generating opportunities. Labourers, food suppliers and service providers may come from different areas beyond the project's primary influence area. *This impact is predicted to be positive, cumulative, and short-term to long-term and of moderate significance.*

## 6.3 OPERATION PHASE

### 6.3.1 Improved working conditions of miners

The gold processing and recovery method deployed by ASGM is amalgamation using mercury, which in turns causing health risks to the people working in the processing mining sites, the surrounding community and environment due to poor handling/usage. Mercury emissions have substantial negative effects on the local environment, the health of the miners, as well as people living near the mines due to poor usage. The major effects of mercury on the ASGM communities occur during the amalgamation process and open burning when undertaken without wearing appropriate Personal Protective Equipment (PPEs) or using retort, respectively. Mercury poses a significant risk to human health because mercury is a potent neurotoxin and systemic toxin. The health burden attributed elementary mercury in artisan gold mining workers is summarized in table 6.4.

**Table 6.4. Disease profiles of the moderate and severe cases of chronic metallic mercury vapor intoxication (CMMVI)**

<i>Moderate case:</i> Adults with high mercury body burden caused by chronic inhalation of metallic mercury vapor who show several of the following symptoms:	<i>Severe case:</i> Adults with a very high mercury body burden caused by chronic inhalation of metallic mercury vapor who show several of the following symptoms:
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<ul style="list-style-type: none"> <li>• Slight tremor of fingers, hands, and limbs; coordination problems; dysfunction of movement control; weakness</li> <li>• Reflexes abnormalities; peripheral nerve abnormalities; sensory disturbances</li> <li>• Sleep disorders; irritability; nervousness; fatigue; memory impairment; difficulty in concentration; shyness; depressive mood; loss of confidence; lack of self-control</li> <li>• Renal effects like enzymuria, proteinuria, and glomerular dysfunction, increased urinary excretion of N-acetyl-β-glucosaminidase (NAG)</li> <li>• Loss of appetite; salivation</li> <li>• Immunological changes</li> </ul>	<ul style="list-style-type: none"> <li>• Pronounced tremor in several parts of the body; severe coordination problems; dysfunction of movement control; weakness</li> <li>• Polyneuropathy</li> <li>• Insomnia; hyperirritability; nervousness; fatigue; loss of memory; difficulty in concentration; extreme shyness; depression; loss of confidence; lack of self-control; social avoidance</li> <li>• Abnormal renal function with enzymuria, high proteinuria, glomerular dysfunction, and rising urinary excretion of N-acetyl-β-glucosaminidase (NAG)</li> <li>• Anorexia; excessive salivation; gingivitis; stomatitis</li> <li>• Immunological changes</li> <li>• Difficulty seeing</li> </ul>
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Source: adopted from Steckling et al. 2015

Proper use of Mercury in ASGM gold extraction operations will help to reduce health risks and environmental impacts associated with the exposure and accumulation. Also, the mercury mineral processing centre at Itumbi area will be equipped with PPEs for the safe handling of mercury. This will have a direct benefit of not only reducing mercury emissions but the reduction in toxic fumes will mitigate impacts on the health of the miners. *The impact is predicted to be positive, long term and of high significance.*

### 6.3.2 Acute and chronic health effects due to exposure to toxic materials

Improper handling of mercury releases the toxic metal into the environment, where it undergoes a persistent and damaging cycle. Mercury released poses severe risks to human health and the environment due to its toxicity and ability to persist and accumulate in ecosystems. The risks and impacts vary based on the type of mercury (elemental, inorganic, or organic), the route of exposure (inhalation, ingestion, or skin contact), and the duration of exposure. Elemental mercury readily vaporizes at room temperature, and its odorless vapor is easily inhaled. This is the most common exposure route in occupational settings. Some forms of mercury can be absorbed through the skin. This can happen with direct contact, such as with skin-lightening products containing mercury salts. Handling toxic mercury materials can result in poisoning, which primarily affects the nervous, digestive, and immune systems. All forms of mercury can severely and permanently damage the brain, especially with high levels of exposure.

Symptoms include tremors, memory loss, insomnia, headaches, extreme irritability, and personality changes. Fetuses and young children are most vulnerable to mercury's neurotoxic effects. Prenatal exposure can impair a child's cognitive thinking, memory, attention, and fine motor skills, potentially causing irreversible neurological damage. Inhaling elemental mercury vapor is highly hazardous and can cause lung damage, including bronchitis and pulmonary edema, and in severe cases, respiratory failure and death.

Further, improper waste disposal eventually settles into land and water. In aquatic environments, microorganisms convert elemental mercury into methylmercury, a highly toxic organic form.

Methylmercury accumulates in aquatic organisms, and its concentration increases exponentially as it moves up the food chain. Large predatory fish, in particular, often contain the highest levels. *The impact is predicted to be negative, long term and of high significance.*

### **6.3.3 Pollution of land and water resources from mercury-contaminated tailings**

During the processing and washing gold ore, crushed ore, water, and unrecovered mercury (tailings/waste material) will be produced at the project site. The tailings will be produced after a portion of the valuable gold have been removed from the ore. Comprised mainly of crushed and milled rock and water, they will also contain mercury used in gold extraction. Due to inefficiencies in ore processing, some tailings contain significant amounts of unrecovered gold and may subsequently be re-processed to recover it. As such a specific long-term stockpile area for the tailings will be established. The plan is to deposit the tailings within the PML area for future reprocessing using cyanide. If not immediately used and left without proper stabilization or containment measures, the piling up of the tailing will inevitably blanket the topsoil and vegetation in the affected area and heavy rain may dispersion into the environment, cause siltation to receiving water bodies. This poses a risk to the environment and human health, especially if tailings contain residual mercury (or other toxic materials). Also, failure of the Tailings Temporary containment could occur due to over-topping of the wall, depending on the design of the facility. Tailings facility overtopping is often triggered by extreme events like heavy rainfall, which can cause the facility to become saturated and unstable. Factors contributing to failure include poor design, construction, or maintenance, especially with less stable "upstream" facility construction methods. Insufficient monitoring and excess water storage on the facility's surface significantly increase the risk of failure.

Overtopping of a mercury tailing pond can lead to the release of toxic mercury and other contaminants, causing severe environmental damage and health risks to humans and wildlife. The overtopping process releases sediment that can contaminate soil and water, alter water chemistry, harming or killing organisms. Mercury can bioaccumulate up the food chain, and the stable, toxic mercury cyanide complexes that can form are especially difficult to remove from water. However, the probability of this impact occurring is very low, as good tailings storage area design would reduce the probability. *The impact is predicted to be negative, long term and of high significance.*

### **6.3.4 Impaired air quality from due to dust emission**

The major sources of air pollution in the proposed project are fugitive dust and exhaust fumes generated as a result of loading and transportation of materials, unloading of the materials as well as crushing of the ore. It is generated at virtually every phase of the operation if weather conditions are conducive. The extent of air pollution will depend on the effects of climatic conditions such as rain, wind and drying capacity of the area. The dust could be hazardous to the miners, and villagers (depending on the wind regime) and also on vegetation and surface water in the general area. If measures will not be taken, much of the vegetation cover in the area will be caked with dust; this may effectively kill the plants since it stops photosynthesis. *The impact is predicted to be negative of long-term duration and moderate significance.*

### **6.3.5 Noise pollution and vibration**

Workplace noise exposure is a key concern at the ASGM facility, as excessive noise can lead to noise-induced hearing loss (NIHL), which is a recognized occupational health risk. During project operations, the main sources of noise will be crushing machinery and the transportation of ore and tailings to and from the processing area. These activities also generate vibration.

Given that residential areas are located at a distance from the project site, the primary impact of noise and vibration is expected to be on personnel working within the facility. Project operations are planned to run continuously for approximately 10 hours per day, resulting in sustained exposure to noise and vibration for workers.

The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations, 2015, stipulate maximum permissible daytime noise levels of 70 dBA for industrial areas. Similarly, WHO and IFC guidelines recommend that noise levels within working areas should not exceed 70 dBA. The commonly accepted occupational exposure limit for noise is an eight-hour time-weighted average (TWA) of 85 dBA. While the 70 dBA limit is particularly relevant for workers in the crushing area, all personnel in operational zones may be at risk of NIHL if exposed over prolonged periods.

Noise exposure can have significant adverse effects on human health and quality of life. In addition to hearing loss, prolonged noise exposure is associated with annoyance, stress, sleep disruption, hypertension, coronary heart disease, and other psychosocial impacts. In children, elevated noise levels can affect learning outcomes through stress-related mechanisms. Considering these factors, the potential impacts of noise and vibration from project operations are predicted to be negative, of long-term duration, and of moderate significance.

### **6.3.6 Public health hazards from sewage**

The wastewater could arise from water used in cleaning. Workers and visitors will respond to calls of nature. The project is not serviced with the centralized sewer system, as such the project will use the septic tank and soak away pit. If system is not well designed or users are not encouraged to use toilets the system might ooze/overflow into the open environment or workers might go to the bush to safe themselves respectively. This will create public health hazards to the downstream communities as waste can be carried by rainwater into receiving water body that are usually dependent by communities downstream. Such health problems include poor sanitation with nuisance of bad smell and associated waterborne diseases. *The impact is predicted to be negative of long-term duration and moderate significance.*

### **6.3.7 Electrical and electronic waste impacts to human health and the environment**

In the gold ores processing and washing facilities operation, there are various types of e-waste to be generated, such as lighting equipment (fluorescent lamps, bulbs), computer, printer, scanners, photocopiers, Air condition, batteries/cells/accessories of electronic equipment etc.). Electrical and electronic equipment contain different hazardous materials, harmful to human health and the environment if not disposed of carefully. Most electronic devices' components are not biodegradable and hence provides a challenge in terms of disposal. There is scientific evidence that electronic waste containing substances like Lead, Cadmium, Mercury, Polyvinyl Chloride (PVC) has immense potential to cause enormous harm to human health and environment, if not disposed properly since the extant prescriptions for its disposal and safeguard are inadequate.

Efforts to deal with the e-waste problem in Tanzania are sporadic and uncoordinated as such it does not match with the gravity of the problem. Generally, there is a lack of awareness on the part of the general public on the e-Waste issues. Improper and indiscriminate disposal of e-waste by the project is likely to lead to the mushrooming of informal waste disposal centers in neighborhoods. Further exacerbates the problem of e-waste where informal e-waste handlers, refurbishes or recyclers are exposed to the adverse health impacts of e-waste as a result of lack of personal protective equipment and skills to dismantle the wastes. However, generation of e-waste is not expected to be significant due to nature of the project. *The impact is predicted to be negative, long-term, and low significant.*

### **6.3.8 Occupational health and safety hazards**

The workers' health concern is a common phenomenon in the workplace. This is not exceptional to the operation of the proposed gold ores processing and washing facilities at Itumbi area in which key potential hazards/aspects expected for occupational health and safety are; - noise pollution from the generating sets/source, injuries from coming into contact with sharp objects, and other physical hazards due to working procedures. Moreover, failure to provide and integrate health and safety (e.g., providing health and safety training to workers, putting in place emergency plans, providing first aid, providing proper personal protective gear and ensuring suitable working conditions) may jeopardize the safety of the workers at site.

Inadequacy of a clear distribution of responsibilities and accountability for health and safety management activities to all employees at all levels may lead to accidents, injuries to workers, loss of lives and/or property. Occupational health hazards may also be promoted by lack of procedures at the project to mitigate negligence at workplace, fatigue due to understaffing and long working hours, employing wrong people on particular jobs e.g., employing an unskilled person, lack of protective gear and thus handling mercury with bare hand, low morale etc. All such hazards will be successfully addressed if safe operating methods and occupational health and safety management systems are in place and workers are provided with health and safety training and personal protective equipment suitable for the types of activities that they will participate in. Failure to provide the above at any point and time of operation may jeopardize the health and safety of workers' at work. *Thus, the impact is predicted to be negative, long-term, and moderate significant.*

### **6.3.9 Non-user-friendly buildings for persons with disabilities (PWDs)**

According to the SHIVYAWATA (2023), in Tanzania, it is estimated around 4.5 million people live with disability. Women have higher disability rates with 7.8% of the country's total population estimated to be women with disabilities vs. 5.7% men. The Persons with Disabilities Act, No. 9 of 2010 defines a person with disability as any person with physical, intellectual, sensory, or mental impairment and whose functional capacity is limited by encountering attitudinal, environmental and institutional barriers. The Act was enacted to provide for the protection of persons with disabilities. It included provisions for access to health care, social support, accessibility, rehabilitation, education and vocational training, communication, employment, and non-discrimination. Most public buildings and facilities in Tanzania are not accessible to people with disabilities despite that the Government has laws and policies in place that strictly instruct how these buildings and facilities should be (Kavishe, F. and Isibika, S., 2018). Despite the effort of the Act which requires all public institutions and offices to create convenient access to persons with disability, many public offices are yet to comply. This presses more considerations of the inclusion of expectations of PWDs in the design of the proposed project components to avoid the elimination of all forms of discrimination and social exclusion. Consideration to PWD shall be given a high priority during designing and if no any mitigation will be taken, then, the impact has high significance. *The impacts are predicted to be negative, cumulative, long-term, and of moderate significance.*

### **6.3.10 Community Health and safety potential risks and impacts**

During the operational phase of a project, community health and safety risks can include exposure to pollution, infectious diseases, traffic accidents, and social impacts. Industrial emissions like particulate matter, sulfur dioxide, and nitrogen oxides can cause respiratory and cardiovascular problems in nearby communities. Long-term exposure increases the risk of asthma, bronchitis, lung cancer, and heart disease. The discharge of untreated wastewater and hazardous chemicals, including heavy metals and

PFAS "forever chemicals", can contaminate local water sources. This poses severe health risks, including waterborne diseases, cancer, and developmental issues, and can also harm ecosystems. Constant noise from machinery and traffic can cause sleep disturbances, anxiety, and a higher risk of heart disease for residents living near the project site. Improper disposal of waste and chemicals can contaminate soil, which can harm communities through food grown in contaminated soil (e.g., vegetables absorbing lead or arsenic). Inadequate emergency response and preparedness measures can amplify the negative impacts of an accidental event on the community

Further, increased opportunities at the gold ores processing and washing facilities at Itumbi Area will be associated with the availability of employment opportunities and hasty income generation. People with the different social backgrounds will immigrate in the project area to access opportunities created. This influx of people in the project area and resultant social interactions among workers and locals are inevitable, especially in mining areas, transportation routes, etc. The apparent relative wealth of the project workers may lead to exploitative behaviour on the hosts' side. Consequences of these interactions could be increased incidences of health impacts such as spread of STDs, HIV/AIDS, breaches of security, and attitudes and behaviour change to indigenous people. The local people, especially youth and women, are the most vulnerable to that social interaction due to their social-economic background. The prevalence of HIV infection among adult's blood donors in Chunya District is in the range of 2.9% to 4%. Therefore, the proposed project is one among several works and other investments in the Chunya District that may pose Public Health Hazards/Safety due to social Interactions. *The impacts are predicted to be negative, cumulative, long-term, and of high significance.*

#### **6.3.11 Creation of employment opportunities**

It is envisaged that the proposed gold ores processing and washing facilities at Itumbi Area will require labour. This will translate to creation of employment to local community hence improvement of local economic empowerment. More population at the Itumbi Village will also translate to more opportunities for the local economy as demand for goods and services trickle down to the local businesses. The proposed project will translate to overall measurable economic and employment growth for the village and ward. Further, people from the local community who will have the opportunity to work in the gold extraction plant will have their skills developed and learn the proper technologies for using mercury in gold extraction and processing through on job training. Local staff will be trained on safety matter under supervision of experienced personnel. *This impact of employment and training is predicted to be positive, long term and of moderate significance.*

#### **6.3.12 Increased income/ revenue/ induced development**

The government is also one of the major beneficiaries of the proposed project since tax revenue will be generated in many ways. This includes revenues from selling the gold. Similarly, wage income accruing to employees will be subject to income tax. There is a potential for increasing tax revenue and tax base expansion, since there is also a tax revenue derived from various value chain components. Besides, total government revenues from the mining sector would rise by establishing the training center. Further, the activities of the center will have a spill-over effect. *This impact is predicted to be positive, long-term, and highly significant.*

#### **6.3.13 Improve local livelihoods from increased business opportunities**

Business opportunities are anticipated around the site to serve the increased number of people visiting and working at the site. The work force at the ASGM gold ores processing and washing facilities at Itumbi area will also require more service providers hence increased business. The result will be more business

opportunities created within the local economy through the multiplier effect which local people will be expected to tap into to improve their livelihoods. *This impact is predicted to be positive, long-term, and of moderate significance.*

### **6.3.14 Pollution of land and water resources from hydrocarbons leaks and spills**

During operation, machinery and equipment on site will require routine servicing and maintenance, which involves the use of oils, lubricants, and grease to ensure smooth and safe functioning. These activities generate used oils, lubricants, and contaminated materials, such as rags or cloths, which, if mismanaged, could lead to contamination of soil and water resources.

Although the quantities of hydrocarbons involved are expected to be relatively small, improper handling or disposal could still pose localized risks of pollution. The potential impacts of hydrocarbon spills or leaks are therefore considered negative, of long-term duration, and of low to moderate significance. Appropriate measures for the safe storage, handling, and disposal of oils, lubricants, and contaminated materials will be implemented to minimize these risks

### **6.3.15 Air Pollution from Exhaust Emissions**

All machinery that operates on fossil fuels has the potential to generate exhaust gases, which can contribute to air pollution. Atmospheric pollutants from such equipment may include sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>), and particulate matter. The main impact of these emissions is a potential reduction in local air quality, which depends on the quantity of emissions, duration of operation, and prevailing atmospheric conditions.

During project operations, machinery will be used as required for processing and material handling. Given the limited number of machines and relatively small quantities of fuel consumed, the resulting exhaust emissions are expected to be minimal. Therefore, the impact on local air quality and global pollution is predicted to be negative, short-term, cumulative, and of low significance

### **6.3.16 Fire hazards**

Fire is a potential hazard at the facility due to the presence of electrical installations, machinery, and personnel on site, which may involve activities such as cooking or smoking in inappropriate areas. Fires could originate from electrical faults, flammable material storage areas, or unsafe practices by personnel. The consequences of a fire incident could be severe, including property damage, injuries, or fatalities. Therefore, the potential impact of fire at the facility is predicted to be negative, long-term, and of high significance. Appropriate fire prevention and safety measures, including proper storage of flammable materials, installation of fire-fighting equipment, and enforcement of safe work practices, will be implemented to minimize this risk

## **6.4 DECOMMISSIONING PHASE**

The lifespan of the proposed project will dependent on the quantities of the gold ore deposit in the general area, technology used to mine and financial sustainability of the business. Circumstances that may warrant decommissioning include withdrawal or expiry of PML (where the project is located) issued by government agencies, closure by government agencies, court orders and natural calamities. Most of the structures put up by the proponent can be dismantled and have a use somewhere else. The following are some potential impacts for the decommissioning of the project; -

#### **6.4.1 Loss of employment**

It is not envisaged that there will become a time when the gold ores processing and washing facilities at Itumbi area will be closed. The employee and their family will be depending directly or indirectly on the project for their living. Decommissioning of the project means they will lose their means of generating income. This may result in social stress/unrest to the community and lead to conflict with investors. *Loss of job is predicted to be negative, long-term duration and since the survival of the people is very important here the impacts are considered of high significance.*

#### **6.4.2 Public health hazards from tailings**

In closure of the gold ores processing and washing facilities, the project proponent, in consultation with the Mining Commission, may decide to demolish or abandon the constructed structures or turn the building into other use. However, the ultimate of some component pose a good question for safety of the public health and environment. Such component includes tailing storage area. The tailings storage area with contaminants will need to be left in a manner such that any future environmental impacts are minimized. If this is not considered the component might be abandoned in situ and pose public safety hazards. Also, might overflow or ooze and contaminates the water bodies and hence posing public health risks from the contaminants of the mercury and other pollutants. *This impact is predicted to be negative, long term and of high significance*

#### **6.4.3 Noise pollution and vibration**

During the various stages of the decommissioning works, noise sources and potential impacts associated with the demolition works are likely to occur. This includes noise from site traffic (including light and heavy vehicles), noise from the operation of machinery/equipment and dismantling and demolition activities. The demolition works will significantly deteriorate the acoustic environment within the project site and the surrounding areas. The impact receptors are likely to include site workers and other users of the PML. *The impact is predicted to be negative, short-term duration, and low significance.*

#### **6.4.4 Air pollution due to dust emission**

The air quality will be most affected during the demolition work with dust particles from machinery like excavators, electric grinders and mixers. The impact receptors are likely to include site workers and users of the PML. The substance, which will most significantly contribute to air pollution, will be Particulate Matter. PM may cause health hazards when inhaled in significant amounts and reduce visibility. Most of those dust particulates will come from dust particulates from the concrete rubbles and blocks. *The impact is predicted to be negative, short-term duration, and low significance.*

#### **6.4.5 Soil and water pollution**

The potential impacts on the soil and groundwater environment during demolition activities may include:  
- water and soil quality impacts from the demolition/removal of structures within project site; changes in soils and groundwater regime due to excavation works during the demolition activities; contamination of soil and groundwater quality with hazardous materials such as oils, heavy metals, etc. on-site during the demolition activities; site drainage; disposal of wastewater and sewage disposal; and accidental spillages of fuel, oil and chemicals. *The impact is predicted to be negative, short-term duration, and moderate significance.*

#### 6.4.6 Occupational health and safety hazards

During the decommissioning phase, risks of accidents and ill-health due to decommissioning activities, noise and dust are likely to occur. Demolition workers and neighboring residents are also likely to be affected by the dust generated. *The impact is predicted to be negative, short-term duration, and moderate significance.*

**Table 6.5: Summary of Potential Impacts**

Phase	Potential Impacts	Significance Value
Mobilization/Construction	Loss of /disturbance of biodiversity (flora, fauna and ecosystem)	This impact is predicted to be negative, long term, and of low significance
	Accelerated soil erosion	The impact is predicted to be negative, short term and of low significance
	Noise pollution	This impact is predicted to be negative, cumulative, short-term duration and low significance
	Air pollution due to dust emission	This impact is predicted to be of short-term duration, cumulative and of low significance.
	air pollution due to noxious gas emission	This impact is predicted to be negative, cumulative, short-term and of low significance
	Land degradation at the sources of construction materials	This impact is predicted to be secondary or indirect negative impacts, cumulative, short to medium-term and of moderate significance.
	Pollution of land and water resources from hydrocarbons leaks and spills	The impacts are predicted to be negative, short-term duration and of low significance.
	Public health hazards due to construction waste	The impact is predicted to be negative, short term and of moderate significance.
	Environmental pollution from poor management of construction materials	The impact is predicted to be negative, short-term duration and of low significance.
	Community health and safety risks	The potential impact is predicted to be negative, cumulative, short term but of moderate significance.
	Occupational health and safety hazards	This impact is predicted to be negative, long term and of high significance.
	Increased incidence of diseases transmission including HIV/AIDs and STDs	The impact is predicted to be negative, long term and of moderate significance.
	Potential risk and hazards associated with labour	The impact is predicted to be negative, long term and of moderate significance.
	Health and safety risks due to influx of construction workers	The impact is predicted to be negative, long term and of low significance.
	High prevalence of gender-based violence (GBV) in the project area	The impact is predicted to be negative, long term but of moderate significance.
	Gender inequity in employment	The impact is predicted to be negative, long term but of moderate significance.
	Employment opportunities	This impact is predicted to be positive, cumulative, and short-term to long-term and of moderate significance
Operation	Improved working condition of miners	The impact is predicted to be positive, long term and of high significance

Phase	Potential Impacts	Significance Value
	Acute and chronic health effects due to exposure to toxic materials	The impact is predicted to be negative, long term and of high significance
	Pollution of land and water resources from mercury-contaminated tailings	The impact is predicted to be negative, long term and of high significance
	Impaired air quality	The impact is predicted to be negative of long-term duration and moderate significance
	Noise pollution and vibration	The impact is predicted to be negative of long-term duration and moderate significance
	Public health hazards from sewage	The impact is predicted to be negative of long-term duration and moderate significance
	Electrical and electronic waste impacts to human health and the environment	The impact is predicted to be negative, long term and of low significance
	Occupational health and safety hazards	These impacts are predicted to be negative, long term and of moderate significance.
	Non-user-friendly buildings for persons with disabilities (PWDs)	The impacts are predicted to be negative, cumulative, long-term, and of moderate significance.
	Community Health and safety potential risks and impacts	The impacts are predicted to be negative, cumulative, long-term, and of high significance
	Creation of employment opportunities	The impact is predicted to be positive, long term and of moderate significance.
	Increased income/ revenue/ induced development	This impact is predicted to be positive, long term and of moderate significance.
	Improve local livelihoods from increased business opportunities	This impact is predicted to be positive, long-term, and of moderate significance
Decommissioning	Loss of employment	The impacts are predicted to be negative, cumulative, long-term of high significance.
	Public health hazards from tailings	These impacts are predicted to be negative, long term and of moderate significance.
	Noise pollution and vibration	The impact is predicted to be negative, short-term duration and of low significance.
	Air pollution due to dust emission	The impact is predicted to be negative, short-term duration and of low significance.
	Soil and water pollution	The impact is predicted to be negative, short-term duration and of moderate significance.
	Occupational health and safety hazards	The impact is predicted to be negative, short-term duration and of moderate significance.

## 6.5 CONSIDERATION OF ALTERNATIVES

### 6.5.1 Introduction

The World Bank's Environmental and Social Framework (ESF) requires borrowers to analyze project alternatives as a core component of the Environmental and Social Assessment (ESA). This process is mandated by Environmental and Social Standard 1 (ESS1), which governs the assessment and management of risks and impacts for all Investment Project Financing. The analysis of alternatives ensures that projects are developed and implemented using a mitigation hierarchy that prioritizes avoiding adverse environmental and social impacts. According to ESS1, the analysis of alternatives must

systematically consider the feasibility of different project options during the environmental and social assessment. Key requirements include:

- *The "no project" option:* The analysis must establish the environmental and social baseline conditions and assess the potential positive and negative impacts if the project is not implemented. This provides a benchmark for evaluating other alternatives.
- *Alternative designs and locations:* Proponent must assess alternative designs, technologies, and project locations that could avoid or minimize adverse impacts.
- *Mitigation hierarchy:* The analysis of alternatives must be conducted within the framework of the mitigation hierarchy, which consists of four steps:
  - **Anticipate and avoid:** Design projects to completely avoid environmental and social harm whenever possible.
  - **Minimize or reduce:** If avoidance is not possible, minimize or reduce risks to acceptable levels.
  - **Mitigate:** Provide measures to offset or reduce the severity of impacts.
  - **Compensate or offset:** For any significant residual impacts that remain after other measures have been taken, provide appropriate compensation or environmental offsets.
- *Technically and financially feasible options:* The proponent assessment must evaluate the alternatives based on technical, financial, and environmental and social feasibility. The rationale for the final selection must be documented, demonstrating that the chosen option best meets the project's objectives while avoiding or minimizing environmental and social harm.
- *Proportionality:* The level of detail required for the analysis of alternatives is proportionate to the project's nature, scale, and potential risks and impacts. Projects with higher potential risks require a more rigorous and detailed assessment of alternatives.

The alternatives may encompass a wide range of consideration and can represent a choice between the construction and operation of a development and the non-development option. With this in mind, the general principle involved in identifying the option(s) of the proposed project in the area was to ensure that the option chosen would result in optimal social, economic and environmental returns. In effect the option chosen should corroborate well not only for the proponent, but also for the environment and stakeholders in the area. The option with the highest cost benefit factor, the most technically feasible and with least residual impact is identified as the preferred option. The following alternatives have been identified and have been discussed with project proponent as means of reducing environmental effects. They are discussed in further detail below:

### 6.5.2 Alternative Site

In analysing the environmental and social impacts for site selection, there are usually two or more development alternatives to consider for each issue. In the context when a site for construction of Artisanal and Small-Scale Gold Mining Gold Ores Processing and Washing Facilities was chosen a number of factors were considered and these include: -

- i. Activeness of the site – in order for a site to be considered as demonstration centers for safe use of mercury in ASGM it should be active with at least 100 small scale miners and 5 PMLs in the area. other activeness criteria were number of washing bays, number of mine pits, years of operation in the area and gold ore production capacity. This was to ensure to increase the number of beneficiaries of the targeted group. The site with less than 100 miners was disqualified.
- ii. Environmental factors – the site with environmental issues were not considered while the site free from environmental issues was considered. The environmental issues included closeness to the water bodies, protected areas (forest reserves or National parks), and residential areas. As per

requirement of EMA Cap 191 the site was required to be more than 60 meters from the natural water sources and as per Mining Act 2010, at least 200M from residential area.

- iii. Land issues – the site free from land related conflicts was considered while those with unclear land issues or with land conflicts were disqualified. Likewise consent from PML owners and/or surface right owners for the Project without compensation was considered.
- iv. Stakeholder's consent – the site selection process also considered local stakeholders support for the site to be used as demonstration centre. The site with full stakeholder's support was considered in the process while those with unacceptance from stakeholders were disqualified in the process.

In the considerations of all above mentioned factors out of 4 assessed sites in Mbeya region 2 were recommended to meet the factors among of which is the site of Mr. Vicent Bruno Minja (PML0671MBY) located at Itumbi village, Matundasi ward of Chunya District, Mbeya region. It recognizes the viability and need for the proposed development and is designed to address environmental and social issues and concerns.

### **6.5.3 Alternative Technology**

Alternatives technologies for gold ores processing apart of Mercury do exists and are used in the area to some extent. The common one includes VAT leaching method, Carbon in Pulp (CIP) and Carbon in Leaching (CIL) all of which uses cyanide, and Direct Smelting. However, these alternatives have proven not to be feasible for ASGM in Tanzania on the fact that, they require intensive capital expenditure that ASGM cannot afford. The existing alternative technologies are more feasible for medium to large scale miners. Thus, while the best alternative(s) is being investigate to substitute Mercury by the ASGM the safe use of mercury is of paramount to safeguard the health of miners and surrounding environment.

### **6.5.4 No development Alternative**

In the assessment zero option is considered separately to demonstrate the condition without changes on site and with changes on site as far as environmental, social and economic aspects are concerned. Leaving an area in its existing state will mean all foreseen potential impacts will not happen in the area, likewise all potential project positive impacts will not be realized. Considering the area for the project is used for mining activities it is obvious continue changing with ongoing mining activities even without the proposed project. Further, the project will rehabilitate part of disturbed area from mining activities by filling the mine pit in order to construct the facilities, which is positive aspect. Thus, turning this part of land into compatible economic activities with positive impacts far beyond the core area (awareness to ASGM of the large area) is something cannot be easily ignored. Considering the nature and level of significance of the potential negative impacts (i.e most of which are usual impacts to most development and are graded moderate to low significance) and the potential means to offset the impacts (which do exist), the project cannot be foregone in the area.

Based on the few noted sentences above the alternative is for project other than zero option. The project will aid towards safeguarding the health of artisanal small scale gold miners in the area as well as protecting the surrounding environment from haphazard use of mercury in the area.

# 7 ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES

## 7.1 INTRODUCTION

The impacts which are most likely to affect the environment in the execution of the proposed gold ores processing and washing facilities at Itumbi area have been identified and analyzed in Chapter 6. Based on the analysis and hence classification of the most likely significant environmental and social impacts, specific impact management measures have been identified to anticipate and avoid, minimise or offset the adverse significant biophysical, social and relevant effects of developmental proposal. These are presented in this chapter 7 while the standards upon which the mitigation measures are targeted, the responsible entity and the associated mitigation costs are presented as part of the Environmental and Social Management Plan of Chapter 8.

## 7.2 MOBILIZATION/CONSTRUCTION PHASE

### 7.2.1 Loss of /disturbance of biodiversity (flora, fauna and ecosystem)

Clearance of part of the vegetation at the project site to pave the way for the construction of the proposed gold ores processing and washing facilities will be inevitable. The proponent and contractor shall ensure that clearance of the site for construction purposes shall be kept to a minimum and areas that the project will not impact shall not be disturbed. The Contractor shall mark out the extent of clearing within the approved worksite and instruct all construction workers to restrict clearing to the marked areas and not work outside defined work areas. In the same vein, there will be strict control of construction vehicles to ensure that they operate only within the area to be disturbed by construction works. Also, the proponent will rehabilitate by seeding or planting native trees to all areas that will not be occupied by the buildings and other project facilities. The contractor will avoid planting non-native and exotic species on the site.

### 7.2.2 Accelerated soil erosion

Erosion controls measures will be implemented, including avoiding earthworks during the wet season and periods of heavy rain (unless needed to prevent erosion) and stabilizing exposed areas of soil. Deliberately re-cover exposed soils with grass and other appropriate species as soon as possible during dry season to enable vegetation growth before wet season. Also, temporarily shall bind exposed soil and redirect flows from heavy runoff areas that threaten to erode or result in substantial surface runoff to adjacent water courses. Further the contractor shall ensure that backfilling is done adequately, compacted, and the site restored. The earth used for backfilling shall be free from all roots, grass, shrubs, vegetation, trees, and rubbish. The backfilling operation will be performed in such a manner so as to prevent washing away of soil.

### 7.2.3 Noise pollution

The proponents shall implement several measures that will mitigate noise pollution arising during the mobilization/construction phase. Such measures will include hydraulic construction in preference to percussive techniques where practical. Installation of portable barriers to shield compressors and other small stationery equipment where necessary, use of quiet equipment (i.e., equipment designed with noise control elements) and all vehicles will be ensured to have properly functioning mufflers. The construction activities shall, where possible, be confined to regular day time working hours. All construction machinery will be maintained and serviced under the contractor's specifications; silenced where appropriate and operated to prevent excessive noise and switched off when not in use. Loading and unloading of vehicles,

dismantling of equipment such as scaffolding or moving equipment or materials around the site will be conducted as practicable during daytime hours, and noise complaints will be immediately investigated. Workers operating equipment that generates noise will be equipped with the appropriate noise protection gear.

#### **7.2.4 Air pollution due to dust emission**

The following shall be done;-

- All fine earth materials will be enclosed during transportation to the construction site to prevent dust generation along the route. Trucks used for that purpose will be fitted with tailgates that close properly and with tarpaulins to cover the materials.
- Vehicle speed limits will be set for drivers in sensitive areas i.e. community centres, schools and health facilities to minimize dust generation on-site and haul routes.
- Also, concrete batching/mixing equipment will be well sealed and equipped with a dust removal device.
- Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the Supervisor.
- Any complaints received by the Contractor regarding dust will be recorded and communicated to Supervisor.
- To prevent a dust, stockpiles of fine materials (e.g., sand) will be wetted or covered with tarpaulin materials during windy conditions.

#### **7.2.5 Air pollution from noxious gas emission**

The following shall be done;

- Reducing air emissions from exhausts shall be achieved by contracting new equipment or well serviced and maintained equipment.
- Equipment maintenance to be undertaken in accordance with manufacturer's instructions and at the specified maintenance interval.
- No vehicles or equipment's to be used that generate excessive black smoke.
- Where practical, the contract will inspect machines and vehicles on delivery.
- Also, contractor will enforce vehicle load restrictions to avoid excess emissions from engine overloading.
- Equipment operators will be trained and will follow equipment operational guidelines and standards.

#### **7.2.6 Land degradation at point sources of construction materials**

To effectively mitigate the above impacts, exploitation of construction materials will be from the authorized sources only. The suppliers of the materials shall have to show evidence authorization of the sourced materials. If the point source of the materials are not active the supplier shall ensure to leave the borrow pit site with safe angles for public safety aspects.

#### **7.2.7 Pollution of land and water resources from hydrocarbons leaks and spills**

The following will be done;

- Prior instructions to contractors on handling of hazardous waste such as oils, lubricants and gasoline during construction process.

- Oils, hydrocarbons and other hazardous materials will be stored in designated locations with specific measures to prevent leakage and release of their contents, including the siting of the storage area away from storm water drains and on an impermeable base with impermeable containment that has no outflow and is of adequate capacity to contain 110% of the largest containers in it.
- The contractor will have spill response plan, kits, and trained personnel. The trained personnel in proper handling, storage and clean-up of contaminating material from the environment.
- Routine maintenance and checks of contractors' equipment and trucks to ensure there is no leaks shall be done.

### **7.2.8 Public health hazards due to construction waste**

To mitigate the impacts of wastes, an efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials shall be instituted at the project site. A site waste management plan shall be prepared by the contractor to be followed. This will include designation of appropriate waste storage areas, collection and removal schedule, and a system for supervision and monitoring. Introduction of waste disposal bins, warning notices, "Dos & Don'ts" etc., posted at strategic points throughout the project area.

Much of the excavated soil and rubble materials will be reused as initial filling materials for abandoned mine pits, and where levelling of the project site is required. Cleared vegetation and topsoil will fill up any other infrastructures (pits, etc.) that need filling. Non-biodegradable waste (e.g., Batteries, plastics, rubbers, tyres, etc.) shall be removed from the site for recycling, treatment, and/or disposal by a licensed contractor as appropriate. Waste management training for all personnel and operators at the project site will be provided.

### **7.2.9 Environmental pollution from poor management of construction materials**

To mitigate the impact of haphazard storage of construction materials, safe storage areas will be identified and retaining structures put in place before the arrival and placement of material. The stockpiling of construction materials will be properly managed and controlled to ensure are not away by rain water or storm water.

### **7.2.10 Community health and safety risks**

The contractor shall engage only qualified drivers with appropriate driving license matching with the intended vehicle to be used. Induction course shall be done to all drivers prior starting the development phase, and new coming drivers shall be subjected to induction course prior to commencing work. Further drivers shall be sensitized among others to maintaining speed limits for main roads and on material access roads. Also, by providing both road and safety signs to the public and drivers at the core activity project site(s). All large or over-size transport vehicles will be accompanied by escort cars equipped with flashing yellow warning lights while in transit on public roads.

### **7.2.11 Occupational accidents at the workplace**

To mitigate this impact, proponent and contractor shall comply with relevant Tanzania (OSHA, 2003) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements, including the provision of Person Protection Equipment (PPE), reasonable working hours and good working conditions and facilities. Also, health and safety on-site shall include standard best

practice provisions in the construction contract, together with (i) appropriate BoQ items so that at least some elements of H&S are a pay item (financial incentive), (ii) a mechanism for withholding payments if the contractor is not compliant with the H&S provisions. Note that the provisions shall include insurance to enable the contractor to pay for any treatments required by his workers, including those of all sub-contractors, and any subsequent lifelong disability payments, loss of life, or personal effects.

#### **7.2.12 Increased incidence of disease transmission, including HIV/AIDS and STDs**

The project proponent and contractor will devote time to raising awareness of the dangers of HIV/AIDS within the project premises. Although basic knowledge of HIV/AIDS is high among Tanzanians, knowledge of self-protection measures and behaviour change will be provided, and a preference will be given to those who are vulnerable and to empower women, for they compose one of the most vulnerable groups. When the need arises, the project proponent and contractor will seek professional assistance from organizations working in public health and control of HIV/AIDS for instituting a health education and disease control programme at the workplace.

#### **7.2.13 Potential risk associated with child labour**

To prevent the exploitation of child labour, the proponent and Contractor will comply with the provisions in the Employment and Labour Relations Act, 2004 and the ILO Convention No. 182. The proponent will develop transparent human resources policies and procedures for the recruitment process, working conditions, terms of employment, wages, worker-employer relations, non-discrimination policy, monitoring, roles and responsibilities. The proponent expects its contractors to adhere to the principles outlined in the Contract, which will cover inter alia, standards related to Labour and the prohibition of Child Labour. Employment of child labour (children below the age of 18), pregnant women and elder citizens in hard labour and dangerous activities will be prohibited.

#### **7.2.14 Health and safety risks due to influx of construction workers**

To avoid increasing the influx of people, semi-skilled and unskilled labour required by the project will be sourced locally to provide communities with employment and the opportunity to earn an income during the construction phase. Local communities will be given prior information through village government offices on available employment opportunities and required qualifications. A special clause that requires local peoples to be employed as labourers during construction will be included in the contract.

#### **7.2.15 High prevalence of gender-based violence (GBV) in the project area**

The proponent will emphasize to all contractors to provide equal employment opportunities between men and women depending on required qualifications at all level. During construction local employment shall be optimized by allocating jobs fairly (consider gender, marginalized groups), involve community leaders/committees to identify suitable/able people for the jobs, review to avoid bias or favoritism observe national/and international labour standards. The proponent and contractor will conduct mandatory and periodic training for workers on required lawful conduct in host community and legal consequences for failure to comply with laws on gender-based violence (GBV). The proponent will roll out its Grievance Redress Mechanism (GRM) of the proposed project for communities living in the project's Area of Influence and collect information about GBV and associated social ills on a monthly basis with a view to resolving it with the project contractor. The proponent will identify and create a partnership with a local NGO to report workers' misconduct and complaints/reports on GBV or harassment through the GRM.

## **7.2.16 Gender inequity in employment**

The proponent will ensure that women are given adequate employment opportunities during recruitment and job postings. Regular sensitization and awareness campaigns to the workers will be done to promote gender equity in employment during the construction works and during operation. Gender disaggregated data, separate bathing, changing room, sanitation facilities for men and women will be provided. Zero tolerance on sexual harassment, all forms of gender-based violence and discrimination at all phases of the project will be imposed.

## **7.3 OPERATION PHASE**

### **7.3.1 Acute and chronic health effects due to exposure to toxic materials**

The proper use of mercury to ASGM gold extraction operations helps to reduce health risks and environmental impacts associated with the exposure and accumulation. NEMC and other stakeholders will provide demonstration of safe uses and handling of mercury at the ASGM sites. Also, will provide PPE and demonstrate on the proper uses of appropriate PPEs for safe uses and handling of mercury during gold washing and recovery by amalgamation process. This will increase knowledge and awareness to the miners on the importance of using proper PPEs and safe uses and handling of mercury in ASGM sites during gold recovery by amalgamation process. Wearing appropriate PPE, such as nitrile gloves, safety goggles, and lab coats, to prevent skin contact and accidental ingestion.

All areas where mercury is used will have a dedicated mercury spill kit. A proper cleanup procedure involves containing the spill and using a special vacuum or chemical powder to absorb and collect the mercury. The regular vacuum cleaner will never be used to clean up a mercury spill, as this will spread toxic vapors throughout the area. All mercury and contaminated materials will be clearly labeled and disposed of as hazardous waste by a certified contractor.

### **7.3.2 Pollution of land and water resources from mercury-contaminated tailings**

The project will establish a dedicated temporary containment area for mercury-contaminated tailings generated from the amalgamation ponds. When the amalgamation ponds reach capacity, tailings are scooped out and transferred to this containment area, which measures 3.6 m × 3.35 m × 0.6 m. The facility is designed with drainage channels that return water back to the amalgamation ponds, maintaining circulation and minimizing water loss.

Mercury amalgamation typically recovers only a small fraction of gold from the ore, leaving most of the gold within the tailings. As a result, these tailings retain residual economic value and can be reprocessed in one of two ways:

- i. By the original ore washing operators themselves, who may hire Carbon-in-Pulp (CIP) facilities to recover the remaining gold.
- ii. By third-party CIP operators, who purchase the mercury-contaminated tailings for residual gold recovery

Once processed through CIP operations, tailings are discharged to engineered Tailing Storage Facilities (TSFs), which safely contain the residual waste and minimize environmental risks.

The temporary containment area serves as intermediary storage to prevent accumulation beyond its capacity. It usually reaches full capacity within 2 to 3 months, after which tailings are collected and transferred for further processing. The area will be securely fenced to prevent unauthorized access, and regular inspections will be conducted to ensure structural integrity and proper functioning of drainage channels. (Section 2.6 and appendix 8 & 9)

### **7.3.3 Impaired air quality**

The project proponent will adopt wet crushing technology to minimize amount of dust generated during crushing rock ore. The equipment design will have an inherent mechanism to control excessive dust emission from the process. Workers working in the crushing points shall provide appropriate protective gear (i.e., breathing masks). Gaseous emissions will be minimized by sourcing low-emission equipment such as vehicles, where practicable. Air quality will be monitored for comparison with applicable standards (the Environmental Management (Air Quality Standards G. N. No. 237) Regulation, 2007), and action taken to prevent exceedances will be instituted.

### **7.3.4 Noise pollution and vibration**

Noise from crushers and other operating equipment on site is expected to primarily affect workers, as nearby residential and public receptors are located at a considerable distance. For personnel on site, noise levels may be significant enough to impact health. To minimize noise and vibration impacts, the following measures will be implemented:

- i. Equipment with lower noise levels will be selected where practical. Vibration isolation and acoustic enclosures will be installed for mechanical equipment as needed, and the operation of noisy machinery will be limited to daylight hours whenever feasible.
- ii. Equipment maintenance and servicing will be undertaken in accordance with manufacturers' instructions and at specified intervals.
- iii. Activities that generate disturbing noise conditions will be restricted to normal working hours.
- iv. Equipment operators will be trained and required to follow operational guidelines and standards.
- v. Workers operating noisy equipment will be provided with appropriate personal protective equipment (PPE) for hearing protection.

These measures are expected to minimize occupational exposure to noise and vibration, ensuring compliance with relevant regulatory standards and protecting the health of workers on site

### **7.3.5 Public health hazards from sewage**

The project proponent shall take reasonable precautions to prevent the pollution of the water resources. Sanitary arrangements shall be to the satisfaction of the Public Health Act, 2008, and the Local Government (District Authorities) Acts, [Cap. 287 R.E 2019] requirement. Thus, the facility will have a sanitary facility to correspond to the number of workers, sex and people with disabilities. Further wastewater generated from sanitary areas will be directed to the constructed standard septic tank and soak-away pit system for onsite management. The proponent will establish a continuous environmental monitoring program to ensure water resources (monitoring boreholes) around the site are safe from sewage.

### **7.3.6 Electrical and electronic waste impacts to human health and the environment**

To effectively mitigate the above impacts, the gold ores processing and washing facilities project shall procure electronic devices from credible manufacturers to avoid purchasing second-hand, refurbished, or obsolete devices with short lifespans or already categorized as e-waste. The proponent shall recycle all e-waste by establishing an e-waste collection point at the center, including a dedicated collection room. The proponent shall engage a certified e-waste contractor to collect and transport all e-waste to the

approved recycling company. The project will conduct awareness and sensitization targeting the users of the electronic devices to ensure that they engage in best practices for e-waste management.

### **7.3.7 Occupational health and safety hazards**

To protect workers from occupational hazards, the proponent shall provide and enforce use of appropriate protective gear according to the workplace, e.g., clothing, footwear, gumboots, gloves and belts; safety goggles and shields. Also, an adequate number of fire extinguishers will be installed in all strategic locations of the project site to put out the fire in case of any emergency; provide first aid facilities and a room/ post within the workplace, and train some workforce on emergency response measures; conduct risk assessment at least annually as per section 60 of the OHS Act 2003. Appropriate safety measures will be developed based on a risk assessment and may include adequate ventilation in the office or in workers' long-exposed working area, and guidance on safe working in confined spaces; establish safe working procedures/guidelines which will be followed by all employees working in the project premises. The proponent will also monitor occupational hazards risks and provide timely rectification before waiting for incidence.

Further, the proponent shall formulate the Occupational Health and Safety Policy (requirement of section 96 of OHS Act 2003). The medical examination shall be carried out annually by an Occupational Health Physician as per section 24 of the Occupational Health and Safety Act, 2003. Manuals and training regarding the correct handling of materials and packages shall be in place and updated as new or updated material safety data sheets become available; and maintenance of hygiene conditions at all workplace washrooms. Standard operating procedures shall be developed that shall integrate OHS and environmental compliance at each working station/area.

More importantly, the proponent will organize regular toolbox talks, which is a key component of a robust safety program. Regularly holding these informal meetings is best practice to address hazards, reinforce training, and document safety efforts, which can help demonstrate compliance to authorities.

### **7.3.8 Non-user-friendly buildings for people with disabilities (PWDs)**

All project buildings will be designed and built with ramps and other special facilities, such as toilets, to facilitate access and use by PWDs. The design process of the structures to be used shall consider the requirements of PWDs to ensure key access and user-friendly facilities are constructed.

### **7.3.9 Community Health and Safety Potential Risks and Impacts**

The proponent will involve local communities, authorities, and institutions in assessing and managing health and safety risks. This will include establishing grievance mechanisms to track and address community concerns. Development of effective measures to address potential emergency events, such as hazardous material spills or explosions, including clear communication protocols and procedures. Continuously monitor health and safety performance using key performance indicators and review the effectiveness of control measures. Incident investigations should identify root causes and implement corrective actions.

The proponent will institute HIV/AIDS awareness and prevention campaign amongst workers and users of the facility e.g., post and maintain HIV/AIDS information posters at prominent locations within the project site. Although basic knowledge of HIV/AIDS is high among Tanzanians, knowledge of self-protection measures and behavior change will be provided, and a preference will be given to those who are vulnerable and to empower women, for they compose one of the most vulnerable groups. When the

need arises, the project proponent and contractor will seek professional assistance from organizations working in public health and control of HIV/AIDS in the area for instituting a health education and disease control programme at the workplace.

### **7.3.10 Pollution of land and water resources from hydrocarbon leaks and spills**

The following measures will be implemented to prevent and manage potential hydrocarbon spills and contamination from machinery and equipment used on site:

- i. Hydrocarbons and their resulting used oils shall be stored in drums or containers within a bunded area with an impervious surface to prevent spillage or leakage outside the bund.
- ii. Used oil filters from servicing of machinery, as well as rags or cloths contaminated with grease or oil, shall be collected and stored within the bunded area.
- iii. Absorbent materials will be maintained within the bund to manage minor leaks or spills effectively.
- iv. Once collected in significant quantities, used oil, filters, and contaminated materials will be handed over to certified collectors or agents for proper disposal or recycling.
- v. The storage area will be designed to prevent rainwater from entering the bund and to contain all hydrocarbons safely.
- vi. Equipment will be inspected for lubricant leaks before operation.
- vii. Workers will be trained on proper handling and storage of hydrocarbons.
- viii. Emergency response measures will be established on site, including the availability of absorbent materials, sand kits, and other spill response resources to manage accidental leaks or spills.

These measures are designed to minimize the risk of soil and water contamination, ensuring compliance with environmental standards and protecting local resources

### **7.3.11 Air pollution from exhaust emission**

The following measures will be implemented to minimize air pollution from exhaust emissions generated by machinery and equipment on site:

- Routine maintenance and servicing of all equipment will be undertaken in accordance with manufacturers' instructions and at specified maintenance intervals to ensure efficient operation and reduce exhaust emissions.
- Equipment operators will be trained and required to follow proper operational procedures to minimize unnecessary fuel consumption and emissions.
- Regular inspections of all fuel-powered machinery will be conducted to assess performance, identify potential issues, and implement preventive maintenance.

These measures will help limit air pollution, ensuring compliance with relevant environmental standards and reducing potential impacts on local air quality.

### **7.3.12 Fire hazards**

Further, the following shall be done; -

- Drawings shall be submitted to Fire and Rescue Force for scrutiny and guidance on fire safety designs and shall adhere to the requirement(s).

- Standard electrical installations shall be done to include covering electrical wire at the site, earthing all building structures at site.
- Dos and don'ts shall be established to include establishing smoking zones
- Warning signs shall be put in fire-sensitive areas to include hydrocarbon storage areas.
- The proponent shall install a firefighting system to include portable fire extinguishers for emergencies at the site.
- Staff shall be trained on how to operate the firefighting equipment.

## **7.4 DECOMMISSIONING PHASE**

### **7.4.1 Loss of employment**

The proponent shall prepare the workers to be employed anywhere else in the Gold Ores Processing and Washing Facilities through the provision of extensive training. Further, the proponent shall ensure that all employees are members of the Pension Fund, and the employees shall ensure that the developer's contributions are made. In the time of decommissioning of this project, the proponent may consider its employees to develop a new project.

### **7.4.2 Public health hazards from tailings**

The contractor will prepare a site waste management plan prior to the commencement of decommissioning works. The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as the base material for new construction work in the district. As reasonably possible, materials will be recycled if the project is decommissioned. Unusable material remaining will be taken to the approved dumping sites. Decommissioning of temporary tailings storage containment will involve stages starting with allowing the facility to naturally dry all its water content through sunlight. Once the material has dried out, topsoil will be spread on top of the facility and vegetated accordingly. The slopes of the of the facility will also be levels with safer slopes for the public and also spread with topsoil and vegetated accordingly. The planted vegetation will be ensured to grow and where necessary, shall be irrigated. Throughout the already established monitoring of the facility shall continue even after closure of the operations for about one year to two years before. In the course of monitoring should there be stranger results measures for containment and mitigation shall be considered accordingly.

### **7.4.3 Noise pollution and vibration from demolishing works**

During decommissioning, the contractor will coordinate activities with project proponent and dampen those vehicles and equipment that produce the most noise levels. Use of equipment designed with noise control elements will be adopted where necessary and demolition exercise will be limited at daytime only. All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise. The contractor will further improve the existing management of noise generation from equipment and staff to ensure that they comply with Tanzanian legislation at decommissioning.

### **7.4.4 Air pollution due to dust emission**

The contractor will douse the surface with water to suppress excessive dust and whenever possible, water sprinklers shall be used. Also, the contractor will provide protective gear (i.e., breathing masks) to workers working in dusty environments. Further, the contractor/proponent will coordinate activities that

produce the excessive dust levels and install portable barriers. All workers operating in dusty areas will be provided with dust mask to protect against extreme dust.

#### **7.4.5 Soil and water pollution**

Demolished materials shall be kept within planned boundaries. Stockpiles or other storage compounds (e.g., demolished material) boundaries shall be marked with physical boundary markers such as posts. Windbreaks or fencing shall be erected between the stockpiles and the predominant wind direction if dusty materials. Monitoring of the works and site practices shall be undertaken to enforce good practice, and compliant behaviour.

#### **7.4.6 Occupational health and safety**

All workers will be sensitized before the exercise begins to control accidents related to the demolition exercise. On accident response, a comprehensive emergency plan will be prepared before demolition begins. Adherence to safety procedures will be enforced at all stages of the exercise. All the necessary health and safety measures will be implemented, including personal protective equipment such as safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles, and ear protectors. Demolition work will be limited to daytime only to avoid workers' accidents due to poor visibility.

### **7.5 ENHANCEMENT OF POSITIVE SOCIO-ECONOMIC IMPACTS**

#### **7.5.1 Employment/income generation**

It is expected that about 20 people will be employed during the construction of the gold ores processing and washing facilities at Itumbi area. Offering local people, the opportunity for employment during the construction or providing services such as supplying construction materials (e.g., timber, gravel) etc., will provide an additional income-generating opportunity to a significant number of persons who may be affected in these targeted areas. This will almost certainly be the case where skilled labour is concerned when there will be no local skilled labour. This minor impact could be turned into a positive impact if the contractor of the aviation training centre is both encouraged to and committed to hiring local labour (especially marginalized groups such as youth), particularly when only semi-skilled or unskilled labour is required. During the tendering process for construction aviation training centre, special clause that requires residents to be employed as labourers shall be included in the contractor's contract

#### **7.5.2 Improving growth of the economy**

Where ever possible, the project will procure materials (such as aggregates, sand, timber etc) from local sources. The use of locally available materials and labour for the proposed project development will contribute to the economy's growth by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes, including VAT which will be payable to the government hence increasing government revenue, while the cost of these raw materials will be payable directly to the producers. Other opportunities at the project site that can be enhanced to contribute to the growth of the economy at local, district, regional and national level includes food vendors (mama Lishe), Kiosk, Taxes from the workers' salary, Tax, procurement of goods and services, charges, fees, levies.

#### **7.5.3 Benefit to local producers and suppliers of goods and services**

It is expected that, materials such as cement, alluminium, roofing sheets, timber, paving blocks tiles, sanitary, plumbing and electrical appliances, steel, and other miscellaneous materials required for

construction can be sourced locally e.g., Chunya or other parts of Mbeya Region, depending on the type of materials required. Therefore, such a demand would create a market for local people and should be enhanced.

#### **7.5.4 Induce development**

To enhance this positive impact to the community living in the vicinity and area of influence; National Environment Management Council and Mining Commission shall ensure efficient of Gold Ores Processing and Washing Facilities at Itumbi area operation and good security within the area and area of influence.

## **8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN**

### **8.1 INTRODUCTION**

The Environmental and Social Management Plan (ESMP) is presented below in table 8.1. This ESMP aims to address identified impacts associated with the proposed Establishment of Processing and Washing Facility for the Artisanal and Small-Scale Gold Miners project at Itumbi Hamlet. Based on the environmental assessment undertaken as part of the assessment, a series of mitigation measures have been identified that aim at reducing and/or eliminating the predicted impacts of the project. It is essential that these mitigation measures are appropriately applied to the project during pre- construction, construction, operation and decommissioning phases, and this management plan provides a strategic framework for their implementation. The proponent and any Contractor shall implement components relevant to design, mobilization of materials and machines and works. The ESMP include an estimation of the costs of the measures so that the project proponent can budget the necessary funds. The estimated costs for implementing the mitigation measures are just indicative, thus, appropriate bills of quantities shall give the actual figures. In any case, the Consultant used informed judgment to develop these figures.

### **8.2 PURPOSE OF THE ESMP**

The purpose of the ESMP is to describe the measures that the contractors and the proponent should implement during the development and implementation of the project to eliminate or reduce, to acceptable levels, key potential impacts as well as social and health impacts related to project activities. All the project parties must fully adhere to the specific measures set out in the ESMP. In particular, the project must strive to avoid significant impacts on the biophysical, socioeconomic, health or safety aspects during implementation. Avoidance through well-detailed design of site-specific works and thorough preparation of the detailed site-specific ESMPs will be key to success in this area. Where impacts cannot be avoided, they must be mitigated by using appropriate measures. The ESMP has been developed:

- i) To bring the Project to comply with Government of Tanzania applicable national environmental and social legal requirements, policies and procedures;
- ii) To guide on EHS issues as required by the World Bank Group EHS Guidelines;
- iii) To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts; and
- iv) To provide an operational reference and tool for environmental and social management during implementation of project activities.

All contractual and legal obligations relating to the ESMP apply to the proponent, the main contractors and any sub-contractors. It is the responsibility of the contractors to provide adequate resources to ensure effective implementation and control of the ESMP. The sub-contractor is responsible to its respective contractor for compliance with the measures presented in the ESMP. It is also the proponent's responsibility, any contractors and their sub-contractors to ensure that all project staff are trained and procedures are understood and followed.

### **8.3 KEY PLAYERS IN IMPLEMENTING THE ESMP**

For effective development and implementation of the Environmental and Social Management Plan (ESMP), it is essential to define the roles and responsibilities of all entities involved in the project. The key players in the implementation of this ESMP include:

- i) Project Financier – the Global Environment Facility (GEF), providing financial support for the EHPMP.
- ii) Project Supervising Institution – the World Bank, responsible for project supervision and ensuring that the EHPMP meets its objectives.
- iii) Project Implementing Agency – the National Environmental Management Council (NEMC), responsible for overall implementation of the EHPMP and oversight of ESMP compliance.
- iv) Lead Institution for Facility Construction – the Mining Commission, responsible for coordinating and supervising the construction of the ASGM Gold Ores Processing and Washing Facilities.
- v) Day-to-Day Project Management / Facility Operator – Mr. Vincent Bruno Minja, the mineral right and surface right holder, is responsible for operating the facility and ensuring adherence to ESMP measures during routine operations.
- vi) Environmental Consultants / Designated Environmental Officer / Safeguards Specialists – responsible for providing technical guidance, monitoring environmental and social safeguards, and supporting compliance with ESMP requirements.
- vii) NEMC Regulatory Role – under the Environmental Management Act (EMA), Cap 191, NEMC is mandated to undertake enforcement, compliance monitoring, and review of environmental impact assessments. NEMC will monitor the project during construction and operational phases to ensure that all mitigation measures set out in Chapter 7 are fully implemented

### **8.4 ENVIRONMENTAL AND SOCIAL AUDIT PROCEDURES**

In complying with the EMA Cap 191, the project will conduct independent audits annually and submit to NEMC a monitoring report. The annual report will review the performance of various environmental and social parameters. The proponent will also ensure compliance with the audit requirements. Environmental and social auditing will seek to undertake the following, as its minimum requirements:

- i) Review all monitoring data and, if deemed warranted by the independent third-party auditor, undertake an independent round of monitoring;
- ii) Review various environmental and social reports compiled throughout the year;
- iii) Review operations, inspect facilities, and observe monitoring activities to assess the effectiveness of the Company's environmental management procedures, implementation and identify potential improvements if deemed appropriate; and
- iv) Prepare an audit report, complete with photographic records and recommendations.

The final audit report, together with monitoring data for the previous year, will be distributed to: the Division of Environment, the National Environmental Management Council, and the District Council through the District Environmental Management Officer for review, guidance and comments. The summary of the key issues of the proposed project and their management are shown in Table 8.1 below.

**Table 8.1: Environmental and Social Management Plan**

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
Mobilization/Construction phase	Loss of /disturbance of biodiversity (flora, fauna and ecosystem)	The proponent and contractor shall ensure that clearance of the site for construction purposes shall be kept to a minimum and areas that the project will not impact shall not be disturbed. The Contractor shall mark out the extent of clearing within the approved worksite and instruct all construction workers to restrict clearing to the marked areas and not work outside defined work areas. In the same vein, there will be strict control of construction vehicles to ensure that they operate only within the area to be disturbed by construction works.	Loses only within core development area, species & number	Proponent/P ML holders -, PIT, and Contractor	800,000
	Accelerated soil erosion	Erosion control measures will be implemented, including avoiding earthworks during the wet season and periods of heavy rain (unless needed to prevent erosion) and stabilizing exposed areas of soil. Deliberately re-cover exposed soils with grass and other appropriate species as soon as possible during dry season to enable vegetation growth before the wet season. Also, temporarily shall bind exposed soil and redirect flows from heavy runoff areas that threaten to erode or result in substantial surface runoff to adjacent water courses.	No eroded area,	Proponent/P ML holders, PIT, and Contractor	1,500,000
	Noise pollution	The following shall be undertaken;- <ul style="list-style-type: none"> <li>Hydraulic construction in preference to percussive techniques where practical. Installation of portable barriers to shield compressors</li> <li>other small stationery equipment where necessary, use of quiet equipment (i.e., equipment designed with noise control elements)</li> <li>all vehicles will be ensured to have properly functioning mufflers.</li> <li>The construction activities shall be confined to regular day time working hours.</li> <li>All construction machinery will be maintained and serviced under the contractor's specifications; silenced where appropriate and operated to prevent excessive noise and switched off when not in use.</li> <li>Workers operating equipment that generates noise will be equipped with the appropriate noise protection gear.</li> </ul>	EM(SCNVP) R, 2015 70 dB(A) (peak readings), daytime at the project site. 55 dB(A) (peak readings), daytime or 45 dB(A) (peak readings) at night for community monitoring. Minimum public/resident annoyance on noise	Proponent/P ML holders, PIT, and Contractor	2,000,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	Air pollution due to dust emission	<p>The following shall be done;-</p> <ul style="list-style-type: none"> <li>All fine earth materials will be enclosed during transportation to the construction site to prevent dust generation along the route. Trucks used for that purpose will be fitted with tailgates that close properly and with tarpaulins to cover the materials.</li> <li>Vehicle speed limits will be set for drivers in sensitive areas i.e. community centres, schools and health facilities to minimize dust generation on-site and haul routes.</li> <li>Also, concrete batching/mixing equipment will be well sealed and equipped with a dust removal device.</li> <li>Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the Supervisor.</li> <li>Any complaints received by the Contractor regarding dust will be recorded and communicated to Supervisor.</li> <li>To prevent a dust, stockpiles of fine materials (e.g., sand) will be wetted or covered with tarpaulin materials during windy conditions.</li> </ul>	<p>EM (AQS), 2007</p> <p>TSP &lt; 0.23, PM<sub>10</sub> &lt; 0.05 &amp; PM<sub>2.5</sub> &lt; 0.025</p> <p>Minimum public/resident annoyance on dust pollution</p>	Proponent/P ML holders -, PIT, and Contractor	2,000,000
	Air pollution from noxious gas emission	<p>The following shall be done;-</p> <ul style="list-style-type: none"> <li>Reducing air emissions from exhausts shall be achieved by contracting new equipment or well serviced and maintained equipment.</li> <li>Equipment maintenance to be undertaken in accordance with manufacturer's instructions and at the specified maintenance interval;</li> <li>No vehicles or equipment's to be used that generate excessive black smoke.</li> <li>Where practical, the contract will inspect machines and vehicles on delivery.</li> <li>Also, contractor will enforce vehicle load restrictions to avoid excess emissions from engine overloading.</li> <li>Equipment operators will be trained and will follow equipment operational guidelines and standards.</li> </ul>	<p>EM (AQS), 2007</p> <p>SO<sub>2</sub>: average 100 µg/Nm<sup>3</sup> (0.129mg/kg) for 24hour;</p> <p>NO<sub>2</sub>: 150 µg/Nm<sup>3</sup> for 24-hours average value;</p> <p>CO: 10mg/Nm<sup>3</sup> for 8 hours;</p> <p>Black smoke PM<sub>10</sub>: 40 to 60 µg/Nm<sup>3</sup></p>	Proponent/P ML holders -, PIT, and Contractor	1,000,000
	Land degradation at point sources of construction materials	Exploitation of construction materials will be from the authorized source only. The suppliers of the materials shall have to show evidence authorization of the sourced materials. If the point source of the materials are not active the supplier shall ensure to leave the borrow pit site with safe angles for public safety aspects.	No degradation / No complaints from the local people.	Proponent/P ML holders, PIT, and Contractor	1,500,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Standard	Level /	Responsible Institution	Estimated Costs (TZS)
	Pollution of land and water resources from hydrocarbons leaks and spills	<p>The following will be done;-</p> <ul style="list-style-type: none"> <li>• Prior instructions to contractors on handling of hazardous waste such as oils, lubricants and gasoline during construction process.</li> <li>• Oils, hydrocarbons and other hazardous materials will be stored in designated locations with specific measures to prevent leakage and release of their contents, including the siting of the storage area away from storm water drains and on an impermeable base with impermeable containment that has no outflow and is of adequate capacity to contain 110% of the largest containers in it.</li> <li>• The contractor will have spill response plan, kits, and trained personnel. The trained personnel in proper handling, storage and clean-up of contaminating material from the environment.</li> <li>• Routine maintenance and checks of contractors' equipment and trucks to ensure there is no leaks shall be done.</li> </ul>	EM (hydrocarbons <10mg/l); No leakage /spillage of hydrocarbons	(WQS)	Proponent/P ML holders, PIT, and Contractor	1,500,000
	Public health hazards due to construction waste	An efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the project site. A site waste management plan shall be prepared by the contractor that will be followed. This will include designation of appropriate waste storage areas, collection and removal schedule, and a system for supervision and monitoring. Introduction of waste disposal bins, warning notices, "DOs & Don'ts" etc posted at strategic points, throughout the project area. Much of the excavated soil and rubble materials will be reused as initial filling materials for abandoned mine pits and where levelling of the project site is required. Cleared vegetation and topsoil will fill up any other infrastructures (pits, etc) that need filling. Non-biodegradable waste (e.g., Batteries, plastics, rubbers, tyres, etc) shall be removed from the site for recycling, treatment, and/or disposal by licensed contractor as appropriate. Waste management training for all personnel and operators at the project site will be provided.	EM (SWM), 2016	No littering / No complaints from the local people	Proponent/P ML holders, PIT, and Contractor	1,500,000
	Environmental pollution from poor management of construction materials	To mitigate the impact of haphazard storage of construction materials, safe storage areas will be identified and retaining structures put in place before the arrival and placement of material. The stockpiling of construction materials will be properly managed and controlled to ensure are not away by rain water or stormwater.	No siltation/ sedimentation due to project activities		Proponent/P ML, PIT, and Contractor	1,000,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	Community health and safety risks	<ul style="list-style-type: none"> <li>The contractor shall engage only qualified drivers with appropriate driving license matching with the intended vehicle to be used.</li> <li>An induction course shall be done to all drivers prior starting the development phase, and new coming drivers shall be subjected to induction course prior to commencing work.</li> <li>Further drivers shall be sensitized among others to maintaining speed limits for main roads and on material access roads.</li> <li>Also, by providing both road and safety signs to the public and drivers at the core activity project site(s).</li> </ul>	<p>Zero accident/exposure within the limits.</p> <p>Minimum public/resident annoyance</p>	Proponent/P ML, PIT, and Contractor	1,500,000
	Occupational health and safety hazards	To mitigate this impact, proponent and contractor shall comply with relevant Tanzania (OSHA, 2003) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements, including the provision of Person Protection Equipment (PPE), reasonable working hours and good working conditions and facilities. Also, health and safety on-site shall include standard best practice provisions in the construction contract, together with (i) appropriate BoQ items so that at least some elements of H&S are a pay item (financial incentive), (ii) a mechanism for withholding payments if the contractor is not compliant with the H&S provisions. Note that the provisions shall include insurance to enable the contractor to pay for any treatments required by his workers, including those of all sub-contractors, and any subsequent lifelong disability payments or loss of life or personal effects.	<p>Tanzania OSHA 2003, Low risk to workers and no exposure.</p> <p>Zero accident/exposure within the limits,</p>	Proponent/P ML holders, PIT, and Contractor	6,000,000
	Increased incidence of diseases transmission including HIV/AIDS and STDs	The project proponent and contractor will devote time to raising awareness of the dangers of the HIV/AIDS within the project premises. Knowledge of self-protection measures and behaviour change will be provided, and a preference will be given to those who are vulnerable and to empower women, for they compose one of the most vulnerable groups. The project proponent and contractor will seek professional assistance from organizations working in public health and control of HIV/AIDS for instituting a health education and disease control programme at the workplace (where feasible).	Tanzania AIDS/HIV Policy, No new HIV/AIDS victim recorded	Proponent/P ML holders, PIT, and Contractor	3,500,000
	Potential risk associated with child labour	The proponent and Contractor will comply with the provisions in the Employment and Labour Relation Act, 2004 and the ILO Convention No. 182. Proponent will develop transparent human resources policies and procedures for recruitment process, working conditions, terms of employment wages, worker-employer relations, non-	No child labor in the construction activities	Proponent/P ML holders, PIT, and Contractor	1,500,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
		discrimination policy, monitoring, roles and responsibilities. The proponent expects its contractors to adhere to the principles set forth in the Contract which will cover inter alia, standards related to Labour and prohibition of Child Labour. Employment of child labour (children below the age of 18), pregnant women and elder citizens in hard labour and dangerous activities will be prohibited.			
	Health and safety risks due to influx of construction workers	Semi-skilled and unskilled labour required by the project will be sourced locally to provide communities with employment and the opportunity to earn an income during the construction phase. Local communities will be given prior information through village government offices on available employment opportunities and required qualifications. A special clause that requires local peoples to be employed as labourers during construction will be included in the contract.	No influx of construction workers	Proponent/P ML holders, PIT, and Contractor	0.00
	High prevalence of gender-based violence (GBV) in the project area	The proponent will emphasize to all contractors to provide equal employment opportunities between men and women depending on required qualifications at all levels. During construction local employment shall be optimized by allocating jobs fairly (consider gender, marginalized groups), involve community leaders/ committees to identify suitable/able people for the jobs, review to avoid bias or favoritism observe national/and international labour standards. The proponent and contractor will conduct mandatory and periodic training for workers on required lawful conduct in host community and legal consequences for failure to comply with laws on gender-based violence (GBV). The proponent will roll out its Grievance Redress Mechanism (GRM) of the proposed project for communities living in the project's Area of Influence and collect information about GBV and associated social ills on a monthly basis with a view to resolving it with the project contractor. The proponent will identify and create a partnership with a local NGO to report workers' misconduct and complaints/reports on GBV or harassment through the GRM.	No new GBV case at the construction site	Proponent/P ML holders, PIT, and Contractor	2,000,000
	Gender inequity in employment	The proponent will ensure that women are given adequate employment opportunities during recruitment and job postings. Regular sensitization and awareness campaigns to the workers will be done to promote gender equity in employment during the construction works and during operation. Gender disaggregated data, separate bathing, changing room, sanitation facilities for men and women will be provided. Zero tolerance on sexual harassment, all forms of gender-based violence and discrimination at all phases of the project will be imposed.	No gender inequality	Proponent/P ML holders, PIT, and Contractor	1,000,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
Operation	Acute and chronic health effects due to exposure to toxic materials	The proper use of mercury to ASGM gold extraction operations helps to reduce health risks and environmental impacts associated with the exposure and accumulation. NEMC and other stakeholders will provide demonstration of safe uses and handling of mercury at the ASGM sites. Also, will provide PPE and demonstrate on the proper uses of appropriate PPEs for safe uses and handling of mercury during gold washing and recovery by amalgamation process. This will increase knowledge and awareness to the miners on the importance of using proper PPEs and safe uses and handling of mercury in ASGM sites during gold recovery by amalgamation process. Wearing appropriate PPE, such as nitrile gloves, safety goggles, and lab coats, to prevent skin contact and accidental ingestion.	Zero accident/ exposure within the limits	Proponent/P ML holders	10,000,000
	Pollution of land and water resources from mercury-contaminated tailings	The project will establish a dedicated temporary containment area for mercury-contaminated tailings generated from the amalgamation ponds. When the amalgamation ponds reach capacity, tailings are scooped out and transferred to this containment area, which measures 3.6 m × 3.35 m × 0.6 m. The facility is designed with drainage channels that return water back to the amalgamation ponds, maintaining circulation and minimizing water loss. Mercury amalgamation typically recovers only a small fraction of gold from the ore, leaving most of the gold within the tailings. As a result, these tailings retain residual economic value and can be reprocessed in one of two ways: <ul style="list-style-type: none"> <li>i. By the original ore washing operators themselves, who may hire Carbon-in-Pulp (CIP) facilities to recover the remaining gold.</li> <li>ii. By third-party CIP operators, who purchase the mercury-contaminated tailings for residual gold recovery</li> </ul> Once processed through CIP operations, tailings are discharged to engineered Tailing Storage Facilities (TSFs), which safely contain the residual waste and minimize environmental risks. The temporary containment area serves as intermediary storage to prevent accumulation beyond its capacity. It usually reaches full capacity within 2 to 3 months, after which tailings are collected and transferred for further processing. The area will be securely fenced to prevent unauthorized access,	EM (SQS), 2007; EM (WQS) 2007;  Land <2 mg/l  Water <0.005	Proponent/P ML holders	15,000,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
		and regular inspections will be conducted to ensure structural integrity and proper functioning of drainage channels. (Section 2.6 and appendix 8 & 9) Also, there will be regular inspections for cracks, seepage, or erosion, and maintenance logs kept by the operator under NEMC oversight. The tailing storage facility will be within the fenced area for public safety purpose.			
	Impaired air quality	The project proponent will adopt wet crushing technology to minimize amount of dust generated during crushing rock ore. The equipment design will have inherent mechanism to control excessive dust emission from the process. workers working in the crushing points shall provide appropriate protective gear (i.e., breathing masks). Gaseous emissions will be minimized by sourcing low-emission equipment where practicable.	EM (AQS), 2007 PM <sub>2.5</sub> not to exceed 250 mg/Nm <sup>3</sup> (peak readings), No complaints from the local community	Proponent/P ML holders	3,000,000
	Noise pollution and vibration	Noise from crushers and other operating equipment on site is expected to primarily affect workers, as nearby public receptors are located at a considerable distance. For personnel on site, noise levels may be significant enough to impact health. To minimize noise and vibration impacts, the following measures will be implemented: <ul style="list-style-type: none"> <li>• Equipment with lower noise levels will be selected where practical. Vibration isolation and acoustic enclosures will be installed for mechanical equipment as needed, and the operation of noisy machinery will be limited to daylight hours wherever feasible.</li> <li>• Maintenance and servicing of all noise-emitting equipment will be undertaken in accordance with manufacturers' instructions and at specified intervals.</li> <li>• Activities that generate disturbing noise conditions will be restricted to normal working hours.</li> <li>• Equipment operators will be trained and required to follow operational guidelines and standards to minimize noise impacts.</li> <li>• Workers operating noisy equipment will be provided with appropriate personal protective equipment (PPE) for hearing protection</li> </ul>	EM(SCNVP) R, 2015 70 dB(A) (peak readings), daytime at the project site. 55 dB(A) (peak readings), daytime or 45 dB(A) (peak readings) at night for community monitoring. No complaints from public/resident on noise annoyance	Proponent/P ML holders	3,000,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	Public health hazards from sewage	Sanitary arrangements shall be to the satisfaction of the Public Health Act, 2008 and the Local Government (District Authorities) Acts, [Cap. 287 R.E 2019] requirement. Thus, the facility will have a sanitary facility to correspond to the number of works, sex and people with disabilities. Further wastewater generated from sanitary areas will be directed to the constructed standard septic tank and soak-away pit system for onsite management. The project proponent will establish a continuous environmental monitoring program to ensure water resources around the site are safe from sewage.	EM (WQS), faecal coliform level of not more than 100FC per 100ml; Nitrate 30 mg/l, Lead 0.05 mg/l, Sulphate 600 mg/l, Turbidity 30 NTU, DO Less than 75%;	Proponent/P ML holders	5,000,000
	Electrical and electronic waste impacts to human health and the environment	The project shall procure electronic devices from credible manufacturers to avoid purchasing second hand, refurbished or obsolete devices with short lifespan or already categorized as e-waste. The proponent shall recycle all e-waste by establishing an e-waste collection point at the center; including dedicated collection room. The proponent shall engage certified e-waste contractor to collect and transport all e-wastes to the approved recycling company. The project will conduct awareness and sensitization targeting the users of the electronic devices to ensure that they engage in best practice for e-waste management.	EM (HWCM) 2021  As minimum as possible; no complaints from the local people	Proponent/P ML holders	1,500,000
	Occupational health and safety hazards	The proponent shall provide and enforce use of appropriate protective gear according to the workplace, e.g., clothing, footwear, gumboots, gloves and belts; safety goggles and shields. Also, the adequate number of fire extinguishers will be installed in all strategic locations of the project site to put out the fire in case of any emergency; provide first aid facilities and room/ post within the workplace and train some workforce on emergency response measures; conduct risk assessment at least annually as per section 60 of the OHS Act 2003. Appropriate safety measures will be developed based on a risk assessment and may include adequate ventilation in the office or in workers' long exposed working area, and guidance on safe working in confined spaces; establish safe working procedures/guidelines which will be followed by all employees working in the project premises.  The proponent will organize regular toolbox talks which is a key component of a robust safety program. Regularly holding these informal meetings is best practice to address hazards, reinforce training, and document safety efforts, which can help demonstrate compliance to authorities.	Tanzania OSHA 2003, Low risk to workers Zero accident/exposure within the limits,	Proponent/P ML holders	5,000,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	Non-user-friendly buildings for persons with disabilities (PWDs)	All project building will be designed and built with ramps and other special facilities such as toilets to facilitate access and use by PWDs. The design process of the structures to be used shall consider the requirements of PWDs to ensure key access and user-friendly facilities are constructed.	No complaints from the PWDs	Proponent/P ML holders	3,000,000
	Community Health and safety potential risks and impacts	<p>The proponent will involve local communities, authorities, and institutions in assessing and managing health and safety risks. This will include establishing grievance mechanisms to track and address community concerns. Development of effective measures to address potential emergency events, such as hazardous material spills or explosions, including clear communication protocols and procedures. Continuously monitor health and safety performance using key performance indicators and review the effectiveness of control measures. Incident investigations should identify root causes and implement corrective actions.</p> <p>Also, the proponent will institute HIV/AIDS awareness and prevention campaign amongst workers and users of the facility e.g., post and maintain HIV/AIDS information posters at prominent locations within the project site. Although basic knowledge of HIV/AIDS is high among Tanzanians, knowledge of self-protection measures and behaviour change will be provided, and a preference will be given to those who are vulnerable and to empower women, for they compose one of the most vulnerable groups. When the need arises, the project proponent and contractor will seek professional assistance from organizations working in public health and control of HIV/AIDS in the area for instituting a health education and disease control programme at the workplace.</p>	No new case of HIV/AIDS	Proponent/P ML holders	3,000,000
	Pollution of land and water resources from hydrocarbons leaks and spills	<p>The following measures will be implemented to prevent and manage potential hydrocarbon spills from machinery and equipment on site:</p> <ul style="list-style-type: none"> <li>Hydrocarbons and their resulting used oils shall be stored in drums or containers within a bunded area with an impervious surface to prevent spillage or leakage outside the bund.</li> <li>Used oil filters from servicing machinery, as well as rags or cloths contaminated with grease or oil, shall be collected and stored within the bunded area.</li> </ul>	No spillage/leakage, Measures in place	Proponent/P ML holders	3,500,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
		<ul style="list-style-type: none"> <li>Absorbent materials will be maintained within the bund to manage minor leaks or spills effectively.</li> <li>Once collected in significant quantities, used oil, filters, and contaminated materials will be handed over to certified collectors or agents for proper disposal or recycling.</li> <li>The storage area will be designed to prevent rainwater from entering the bund and to contain all hydrocarbons safely.</li> <li>Equipment will be inspected for lubricant leaks before operation.</li> <li>Workers will be trained on proper handling and storage of hydrocarbons.</li> <li>Emergency response measures will be established on site, including the availability of absorbent materials, sand kits, and other spill response resources to manage accidental leaks or spills.</li> </ul>			
	Air pollution from exhaust emission	<p>The following measures will be implemented to minimize air pollution from exhaust emissions generated by machinery and equipment on site:</p> <ul style="list-style-type: none"> <li>Routine maintenance and servicing of all fuel-powered equipment will be undertaken in accordance with manufacturers' instructions and at specified maintenance intervals to ensure efficient operation and reduce exhaust emissions.</li> <li>Equipment operators will be trained and required to follow proper operational procedures to minimize unnecessary fuel consumption and emissions.</li> <li>Regular inspections of all fuel-powered machinery will be conducted to assess performance, identify potential issues, and implement preventive maintenance.</li> </ul>	<p>Units- mg/m<sup>3</sup>  SO<sub>2</sub>&lt;0.5, NO<sub>x</sub> &lt; 0.2,  CO<sub>2</sub> &lt; 500, CO &lt;30,</p> <p>Maintenance/servicing schedule, Trained operators</p>	Proponent/P ML holders	800,000
	Fire hazards	<p>Further, the following shall be done; -</p> <ul style="list-style-type: none"> <li>Drawings shall be submitted to Fire And Rescue Force for scrutiny and guidance on fire safety designs and shall adhere to the requirement(s).</li> <li>Standard electrical installations shall be done to include covering electrical wire at site, earthing all building structures at site.</li> <li>Do and donts shall be establish to include establishing smocking zones</li> </ul>	Zero fire incident, measures in place	Proponent/P ML holders	1,500,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Standard	Level /	Responsible Institution	Estimated Costs (TZS)
		<ul style="list-style-type: none"> <li>Warning signs shall be put in fire sensitive areas to include hydrocarbons storage areas.</li> <li>The proponent shall install firefighting system to include portable fire extinguishers for emergency at the site.</li> <li>Staffs shall be trained on how to operate the firefighting equipment.</li> </ul>				
Decommissioning	Loss of employment	The proponent shall prepare the workers to be employed anywhere else in the Gold Ores Processing and Washing Facilities through the provision of extensive training. Further, proponent shall ensure that all employees are members of the Pension Fund and the employees shall ensure that the developer's contributions are made. In the time of decommissioning of this project, proponent may consider its employees to develop new project.	All employees covered by pension fund		Proponent/P ML holders	1,000,000
	Loss of aesthetics due to haphazard disposal of waste/ tailings	<p>The contractor will prepare a site waste management plan prior to commencement of decommissioning works. The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as the base material for new construction work in the district. As reasonably possible, materials will be recycled if the project is decommissioned. Unusable material remain will be taken to the approved dumping sites.</p> <p>Decommissioning of temporary tailings storage containment will involve stages to start with allowing the facility to naturally dry all its water content through sun light. Once the material have been dried out of water, top soil will be spread on top of the facility and vegetated accordingly. The slopes of the of the facility will also be levels with safer slopes for public and also spread with top soil and vegetated accordingly. The planted vegetation will be ensured to grow and where necessary shall be irrigated.</p>	<p>EM (SWM), 2016</p> <p>No haphazard disposal of waste,</p> <p>Tailing facility closed formally</p>		Proponent/P ML holders	10,000,000
	Noise pollution and vibration	The contractor will coordinate activities with project proponent and dampen those vehicles and equipment that produce the most noise levels. Use of equipment designed with noise control elements will be adopted where necessary and demolition exercise will be limited at daytime only. All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise. The contractor will further improve the existing management of noise	EM(SCNVP) R, 2015 70 dB(A) daytime at the project site. 55 dB(A) (peak readings), daytime or 45 dB(A) (peak readings) at night		Proponent/P ML holders	2,000,000

Phase	Potential Impacts	Management/Mitigation Measures	Target Standard	Level /	Responsible Institution	Estimated Costs (TZS)
		generation from equipment and staff to ensure that they comply with Tanzanian legislation at decommissioning.	for monitoring.	community		
	Air pollution due to dust emission	The contractor will douse the surface with water to suppress excessive dust and whenever possible, water sprinklers shall be used. Also, the contractor will provide protective gear (i.e., breathing masks) to workers working in dusty environments. Further, the contractor/proponent will coordinate activities that produce the excessive dust levels and install portable barriers. All workers operating in dusty areas will be provided with dust mask to protect against extreme dust.	TSP < 0.23, PM <sub>10</sub> < 0.05 & PM <sub>2.5</sub> < 0.025		Proponent/P ML holders	2,000,000
	Soil and water pollution	Demolished materials shall be kept within planned boundaries. Stockpiles or other storage compounds (e.g., demolished material) boundaries shall be marked with physical boundary markers such as posts. Windbreaks or fencing shall be erected between the stockpiles and the predominant wind direction if dusty materials. Monitoring of the works and site practices shall be undertaken to enforce good practice, and compliant behaviour.	No siltation/sedimentation due to decommissioning activities		Proponent/P ML holders	5,000,000
	Occupational health and safety	All workers will be sensitized before the exercise begins to control accidents related to the demolition exercise. On accident response, a comprehensive emergency plan will be prepared before demolition begins. Adherence to safety procedures will be enforced at all stages of the exercise. All the necessary health and safety measures will be implemented, including personal protective equipment such as safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles, and ear protectors. Demolition work will be limited to daytime only to avoid workers' accidents due to poor visibility.	Zero accident/exposure within the limits,		Proponent/P ML holders	2,000,000

Notes:

EM (AQS), 2007 Regulation, 2007	=	The Environmental Management (Air Quality Standards G. N. No. 237)
EM (SQS), 2007	=	The Environmental Management (Soil Quality Standards) Regulation, 2007
EM (WQS) 2007 Regulation, 2007	=	The Environmental Management (Water Quality Standards G. N. No. 238)
EM(SCNVP), 2015	=	The Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015
EM (HWCM) R Management) Regulations, 2021	=	The Environmental Management (Hazardous Waste Control and

# 9 ENVIRONMENTAL MONITORING PLAN

## 9.1 INTRODUCTION

The correct and successful implementation of impact mitigation measures in order to reduce adverse impacts on environmental conditions needs to be ensured by a proper monitoring programme. This chapter presents the Environmental and social monitoring plan (EMP) that will be carried out throughout the project implementation to mitigate the impacts and enhance the benefits of the project. The EMP outlines the specific actions that shall be undertaken to ensure that the project complies with all applicable laws and regulations related to environmental impacts and impact mitigation. The EMP deals with all mitigation required for the physical, biological and socio-economic impacts and focuses on the impacts as provided in table 8.1 above.

## 9.2 OBJECTIVES OF EMP

The EMP applies to, and will be implemented throughout, all phases of the project: mobilization/construction, operation, and decommissioning. The objective of the EMP is to set out clearly the key components of environmental and socio-economic management for the proposed project and thereby ensure that the following concepts are realized throughout the mobilization/construction, operation, and decommissioning.

- i) negative impacts on the physical, biological and socio-economic environments are mitigated;
- ii) benefits that will arise from the development of the proposed project are enhanced;
- iii) support smooth implementation of project with minimum losses to environmental and social infrastructure;
- iv) compliance and guided by National, International laws, standards and guidelines e.g., noise level standards, occupational and safety standards etc and best practice is achieved; and
- v) good will and good relations with communities, and governments at local and national levels are maintained.

## 9.3 MONITORING RESPONSIBILITY

Implementation of the EMP is the solely the responsibility of the project proponent. The proponent shall supervise and monitor components of the monitoring plan and keep record of monitoring outcome. The proponent has ability to provide the necessary supervisory oversight to ensure the mitigation measures are working and where they are not remedial measures are established. The proponent is committed to protect, and will enhance the environment.

Detailed parameters to be monitored have been considered along with responsible institution (s). The proponent will endeavor to ensure that resources are available to implement the EMP throughout all phases of project development and decommissioning. The EMP will be subject to the principle of continuous improvement. The details of environmental and social issues/impacts, proposed parameter to be monitored and timing agencies responsible for execution of proposed actions during mobilisation/construction, operation and decommissioning stages are presented in tables 9.1 below.

**Table 9.1: Environmental and Social Monitoring Plan**

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
Mobilization/Construction	Loss of /disturbance of biodiversity (flora, fauna and ecosystem)	Size of land cleared; type & number of trees planted	Weekly inspection	Project site	M <sub>2</sub> , Number of affected species	Site inspection, Visual observation	Clearance only within core development area/minimum vegetation clearance to the extent possible	Proponent	500,000
	Accelerated soil erosion	Eroded area	Weekly inspection	Project site	M <sub>2</sub> ,	Site inspection, visual observation	No eroded areas, adequate soil erosion management techniques	Proponent	500,000
	Noise pollution	Noise level	Weekly	Project site	dBA	Noise level meter	70 dB(A) daytime	Proponent	1,000,000
	Air pollution due to dust emission	Particulate matter	Weekly	Project site	Mg/m <sup>3</sup>		TSP < 0.23, PM <sub>10</sub> < 0.05 & PM <sub>2.5</sub> < 0.025	Proponent	1,000,000
	Air pollution from noxious gas emission	SO <sub>2</sub> , NO <sub>x</sub> , CO <sub>2</sub> , CO	Weekly	Project site	Mg/m <sup>3</sup>		SO <sub>2</sub> <0.5, NO <sub>x</sub> < 0.2, CO <sub>2</sub> < 500, CO <30,	Proponent	1,500,000
	Land degradation at point sources of construction materials	Documentation on resource procurement practices	Weekly inspection	Project site	Affected resource	Visual observation	No degradation of local resources, no complaints from local people	Proponent	500,000
	Pollution of land and water resources from hydrocarbons leaks and spills	Oil and grease	Monthly inspections	Project site	mg/l	Sampling and analysis (Spectrophotometer)	(hydrocarbons <10mg/l); No leakage /spillage of hydrocarbons	Proponent	250,000
	Public health hazards due to construction waste	Waste/littering	Monthly inspections	Project site	N/A	Site inspection, Observation,	No littering/no complain from local people	Proponent	250,000
	Environmental pollution from	materials storage site	Monthly inspections	Project site	N/A	Site inspection, Observation,	No haphazard placement of materias/	Proponent	250,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	poor management of construction materials						no complaints from the local people		
	Community health and safety risks	Incidents/Lodged complain	Monthly inspections	Project site	Number of incidences/complains	Records	Zero incident/complain	Proponent	250,000
	Occupational health and safety hazards	Incidents	Monthly inspections	Project site	Number of incidents	Accident/incident records	Zero accident/exposure within the limits,	Proponent	1,000,000
	Increased incidence of diseases transmission including HIV/AIDs and STDs	HIV/AIDs incident	Monthly inspections	Project site	Number of people infected	Records/Medical Records	No new HIV/AIDs incident	Proponent	250,000
	Potential risk associated with child labour	Incident	Monthly inspections	Project site	Number of children employed	Workers register book / reported	No child labour at site	Proponent	250,000
	Health and safety risks due to influx of construction workers	Recruitment/ procurement rules and procedures	Monthly inspections	Project site	Number of people	Workers register book	No influx of construction workers	Proponent	250,000
	High prevalence of gender-based violence (GBV) in the project area	GBV case	Monthly inspections	Project site	Number of cases	GBV reports/ cases	No new GBV case at the construction site	Proponent	250,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	Gender inequity in employment	Recruitment/ procurement rules and procedures	Monthly inspections	Project site	Number of GBV cases	GBV reports/ cases	No gender inequality	Proponent	250,000
Operation	Acute and chronic health effects due to exposure to toxic materials	Incident of mercury exposure	Quarterly	Project site	Number of people exposed	Records/Medical Records	Zero accident/ exposure within the limits	Proponent	2,000,000
	Pollution of land and water resources from mercury-contaminated tailings	Mercury,	Quarterly	Project site	mg/l	Sampling and analysis (Spectrophotometer)	Land <2 mg/l Water <0.005	Proponent	500,000
	Impaired air quality	PM10, PM2.5	Quarterly	Project site	mg/m <sup>3</sup> ,	Sampling and analysis	PM10 < 0.15 PM2.5 < 0.075	Proponent	500,000
	Noise pollution and vibration	Noise level	Quarterly	Project site	dBA	Noise level meter	Noise < 70 at the border of the site No complaints from public/resident on noise annoyance	Proponent	500,000
	Public health hazards from sewage	BODs, faecal coliform, Turbidity	Quarterly	Project site	varied	Sampling and analysis	BOD<30 mg/l Coliform<10 <sup>4</sup> counts/100ml, Turbidity < 300 NTU,	Proponent	
	Electrical and electronic waste impacts to human health and the environment	e-waste	Quarterly	Project site	N/A	Site inspection, Observation,	No haphazard disposal of wastes/no complaints from the local people	Proponent	250,000
	Occupational health and safety hazards	Incidents; delivery of training, toolbox talks, PPE usage	Quarterly	Project site	Number of incidents, Contents and number of training, Quality and quantity of PPE	Records,	Zero accident/exposure within the limits,	Proponent	1,000,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	Non-user-friendly buildings for persons with disabilities (PWDs)	Lodged complain	First-year of operation	Project site	Number of complain	Records	No complaints from the PWDs	Proponent	250,000
	Community Health and safety potential risks and impacts	HIV/AIDS Incident	Every 6 months	Project site	Number of incident	Medical records	No new incident	Proponent	250,000
	Pollution of land and water resources from hydrocarbons leaks and spills	Leakage/Spillage incident	Every 6 months	Project site	Number of incident	Visual Inspection	No spillage/leakage, Measures in place	Proponent	250,000
	Air pollution from exhaust emission	SO <sub>2</sub> , NO <sub>x</sub> , CO <sub>2</sub> , CO,	Every 6 months	Project site	mg/m <sup>3</sup>	Ambient air analyser	SO <sub>2</sub> <0.5, NO <sub>x</sub> < 0.2, CO <sub>2</sub> < 500, CO <30, Maintenance/servicing schedule, Trained operators	Proponent	1,500,000
	Fire hazards	Fire incident	Every 6 months	Project site	Number of incident	Incident Records	Zero fire incident, measures in place	Proponent	250,000
	Decommissioning	Loss of employment	Pension fund remittance	Monthly inspection	Project site	Employees registered	Workers register book	All employees covered by pension fund	Proponent
Loss of aesthetics due to haphazard disposal of waste/ tailings		Waste and Tailings	Monthly inspection	Project site	N/A	Site inspection, Observation,	No haphazard disposal of waste, Tailing facility closed formally	Proponent	250,000
Noise pollution and vibration		Noise levels	Monthly inspection	Project site	dBA	Noise level meter	not exceed 75 dB(A) daytime or 55 dB(A) night	Proponent	1,000,000
		Vibration levels/ Peak Particle Velocity (PPV)	Monthly inspection	Project site	mm/s PPV	Vibration meter	0.3 mm/s PPV or	Proponent	1,000,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs (TZS)
	Air pollution due to dust emission	Particulate matter	Monthly inspection	Project site	mg/m <sup>3</sup>	Dust level meter/ Mini-Vol Sampler	TSP < 0.23, PM <sub>10</sub> < 0.05 & PM <sub>2.5</sub> < 0.025	Proponent	1,000,000
	Soil and water pollution	siltation/sedimentation	Monthly inspection	Project site	N/A	Visual	No siltation/sedimentation due to decommissioning activities	Proponent	500,000
	Occupational health and safety	Incidents/exposure	Monthly inspection	Project site	Number of incidents	Medical records, and site inspection	Zero accident/exposure within the limits,	Proponent	1,000,000

## **10. COST BENEFIT ANALYSIS**

### **10.1 INTRODUCTION**

The cost-benefit analysis of this project focuses on economic costs and benefits and social benefits other than income and externalities which are not included as part of the calculation. Exposure to mercury is one of the leading causes of health problems in Tanzania. Through interventions in capacity building and adoption of cleaner approaches and technologies, the project is expected to reduce the environmental health risks from exposure to mercury. The economic analysis is based on both cost-benefit analysis (CBA). The CBA is applied to estimate the social profitability of interventions in mercury pollution reduction in Tanzania. These interventions are expected to provide benefits in terms of reduced morbidity among miners due to less exposure to mercury – leading to an Economic Rate of Return (ERR) between 7% and 48%. Thus, the proposed interventions in pollution reduction from mercury are considered socially profitable.

The project will provide substantial benefits locally e.g., improved health and better work conditions to local communities in Chunya District. Within the secondary audience, direct beneficiaries include: communities who are partially or entirely dependent on the ASGM sector - artisanal and small-scale gold miners, service providers in mining sites, and the surrounding communities in Chunya District. Attention will be given to ensure the participation of local communities, women and vulnerable people at the project site.

### **10.2 NET PRESENT VALUE (NPV) OF THE BENEFITS OF HEALTH IMPROVEMENT**

Toxic waste exposure, specifically mercury pollution, defined as excess amounts of mercury and in the environment, is one of the leading causes of local health problems in Tanzania. Also, these toxic elements are dispersed globally. Air, soils and water quality impairment in Tanzania related to artisan small gold mining became a serious concern of the respected Governments. Economic analysis includes 1) benefit cost analysis to determine if project investment is profitable from the economic viewpoint. In this case the analysis comprises project costs (investment costs) with benefits generated by such an operation - a reduction of morbidity among miners and an increase of lifetime income.

The Net Present Value (NPV) of the benefits of health improvement in miners in Tanzania is estimated in the range from 0 up to US\$8,6 million. Economic Rate of Return (ERR) is estimated from 7% to 48%. Cost-efficiency of project investments in Tanzania is estimated from 0.3 gTEQ to 3.6 gTEQ of emissions reduction per US\$1 million of the project investment cost.

Economic analysis compiles current information regarding the costs of mercury pollution. Such costs may be of two broad types. Some costs are associated with reducing toxic pollution at its sources. Other costs are associated with the impacts of toxic pollution in the environment. The latter category of costs is referred to as “external costs” or “externalities,” because they are “external” to the owners of the farms, businesses, or facilities that generate them. Externalities considered in this project are health cost of the exposed population and cost of ecosystem services lost due to pollution.

Tanzania implements mercury pollution reduction investment. Specifics of the activities planned are summarized in table 10.1.

**Table 10.1. Project activities related to ASGM**

Country	Target area	Area, ha	Planned activities	Targeted population	Target indicators interim	Cost
Tanzania	Selected sites in 7 regions	10 Ha per region	Introduction of alternative gold recovery technology and equipment for ASGM Piloting rehabilitation of abandoned sites	150,000 miners	<ul style="list-style-type: none"> <li>Increased number of ASGM miners using non-mercury methods</li> <li>Reduction in mercury use (Ton/year)</li> </ul>	US\$ 3.79 million

### 10.3 OPPORTUNITIES FOR WOMEN TO MINIMIZE HEALTH RISKS

Women role in ASM is significant, as they are involved in the application of labor-intensive mining methods, processing, and provision of goods and services (e.g., food, cleaning, transporting dirt) to miners. Despite that, they do not have access or control over assets (e.g., land, licenses, data). In addition, legal and cultural discriminations coupled with domestic and care responsibilities, and lack of education, relegate women to passive participation, with no influence on key decision-making. Persistent gender inequalities and cultural norms prevent women from accessing finance, which prevents them from investing in mining equipment and technology required for businesses. This project will provide opportunities for women to increase benefits and minimize health risks from participating in the above sectors. The project will address various gender gaps in access to information (e.g., on safety measures, adoption to cleaner technologies and approaches, availability of training and other public programs) and opportunities for decent work terms and conditions.

### 10.4 COST ANALYSIS OF CLEANER TECHNOLOGIES DISSEMINATION

For ASGM sector, cleaner technologies and providing miners with safe alternatives will have a direct benefit of not only reducing mercury emissions but the reduction in toxic fumes will have beneficial impacts on the health of the miners in Tanzania. Artisanal small-scale gold (ASGM) mining typically involves panning gold-containing alluvial soils or crushed ores with elemental mercury (Hg). Mercury poses a significant risk to human health because mercury is a potent neurotoxin and systemic toxin. Health burden attributed elementary mercury in artisan gold mining workers is summarized in table 10.2.

**Table 10.2. Disease profiles of the moderate and severe cases of CMMVI**

Moderate case: Adults with high mercury body burden caused by chronic inhalation of metallic mercury vapor who show several of the following symptoms:	Severe case: Adults with a very high mercury body burden caused by chronic inhalation of metallic mercury vapor who show several of the following symptoms:
<ul style="list-style-type: none"> <li>Slight tremor of fingers, hands, and limbs; coordination problems; dysfunction of movement control; weakness</li> </ul>	<ul style="list-style-type: none"> <li>Pronounced tremor in several parts of the body; severe coordination problems; dysfunction of movement control; weakness</li> </ul>

<ul style="list-style-type: none"> <li>• Reflexes abnormalities; peripheral nerve abnormalities; sensory disturbances</li> <li>• Sleep disorders; irritability; nervousness; fatigue; memory impairment; difficulty in concentration; shyness; depressive mood; loss of confidence; lack of self-control</li> <li>• Renal effects like enzymuria, proteinuria, and glomerular dysfunction, increased urinary excretion of N-acetyl-<math>\beta</math>-glucosaminidase (NAG)</li> <li>• Loss of appetite; salivation</li> <li>• Immunological changes</li> </ul>	<ul style="list-style-type: none"> <li>• Polyneuropathy</li> <li>• Insomnia; hyperirritability; nervousness; fatigue; loss of memory; difficulty in concentration; extreme shyness; depression; loss of confidence; lack of self-control; social avoidance</li> <li>• Abnormal renal function with enzymuria, high proteinuria, glomerular dysfunction, and rising urinary excretion of N-acetyl-<math>\beta</math>-glucosaminidase (NAG)</li> <li>• Anorexia; excessive salivation; gingivitis; stomatitis</li> <li>• Immunological changes</li> <li>• Difficulty seeing</li> </ul>
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Source: adopted from Steckling et al. 2015

Steckling et al. (2017) estimates Years Life with Disability (YLD) attributed to moderate cases of CMMVI (mortality and severe cases are not included in the analysis) based on the annual prevalence rate of CMMVI (24.2-29.9%) (Steckling et al., 2017), disability weights (DWs) for moderate cases (DW: 0.368, UI: 0.261-0.484) and severe cases (DW: 0.588, UI: 0.193-0.907) (Steckling et al 2015). The DW of moderate CMMVI, which is used in this analysis, is based on the same disease description presented in table 10.1 above. Severe cases of CMMVI are excluded because it is assumed that gold miners suffering from such severe health effects are no longer able to work and thus not included in the prevalence numbers. YLDs are presented with Uncertainty Intervals (UIs) basically indicating the impact of the uncertainty of the DW. Lost YLDs are valued at GDP per capita in Tanzania to come up with the annual health burden attributed to the artisan gold mining. Benefit-cost analysis for ASGM in Tanzania is based on a number of important assumptions:

- Project life is 4 years, investments start in year 1, benefits flow starts in year 2;
- Given the uncertainty of clean technology dissemination, we assume 3% of miners in lower case and 5% of miners in higher case convert to safe alternatives and cleaner technologies;
- Investments are sustainable, and the Government of Tanzania continues cleaner technologies dissemination in Chunya District after the project implementation;
- The growth rate of GDP per capita in Tanzania is in the range 2-4.5% last 10 years.

## 10.5 BENEFITS OF HEALTH IMPROVEMENT IN MINERS

Results of benefit-cost analysis for ASGM in Tanzania presented in table 10.3. The NPV of the benefits of health improvement in miners is estimated in the range from 0 for 3% miners that start using cleaner technologies each year, 2% annual GDP per capita growth rate and 10% discount rate up to US\$8,6 million for 5% miners that start using cleaner technologies each year, 4.5% annual GDP per capita growth rate and 5% discount rate (25 years of project cycle). ERR is estimated from 7% to 48%. The core of the project will be based on short- and long-term Best Available Techniques/ Best Environmental Practice (BAT/BEP) actions, with the main goal to introduce the basis to achieve a progressive phasing out of the mercury pollution in ASGM sector, and open burning practices, by setting up demonstrative programs in mines in operation. The demonstration activities will be carried out where the environmental, economic and social benefits could be maximized not only on the national but on the regional level as well. This will lead to cost-efficient use of international financial resources.

**Table 10.3: Benefit-cost analysis for ASGM in Tanzania**

Discount rate	5%		10%	
	3% miners use cleaner technologies	5% of miners use cleaner technologies	3% miners use cleaner technologies	5% miners use cleaner technologies
NPV, US\$ million	\$0.8	\$16.6	-\$0.4	\$8.6
ERR	7%	48%	7%	48%

## 10.6 COMMUNITIES BENEFITS

The benefit to the communities may be looked into in different perspectives. The successful construction of the proposed project at Itumbi area will make money for local contractors and services provider who will be involved in the project e.g., Construction firms, Architectures, Soil surveyors, ESIA Consultants, etc. who in turn will pay taxes which the Government will use to provide social services to the community. The project activities will also generate employment during the construction and operation of the projects and facilities. As indicated in chapter 2, the activities that the project accommodates, will provide direct employment to Tanzanians from all businesses and services. In addition to the project operational expenditure on local goods and services, including staff wages, food and beverages, concession fees, utilities and maintenance, the project demonstrates the indirect contributions through discretionary spending outside the facility and induced spending by staff. It also suggests demonstration effects around training, standards, and stimulation of private sector development and recognizes the additional benefits generated during construction. Generally, since the project has a positive net present value, it will contribute to Tanzania's economic growth and development.

## 10.7 POSSIBLE COSTS TO GOVERNMENT

As already mentioned, the Government will directly and indirectly benefit from taxes generated during the operations of the Gold Ores Processing and Washing Facilities at the Area. Apart from tax generation, the project will also enhance the economic growth and reduce the health risks caused by exposure to mercury as such reduce the government expenditure on health sector. The government's image in the promotion of the ASGM sector will also be enhanced nationally and internationally, which will increase attractions from other local and foreign funders and ensure continued ASGM growth.

## 10.8 ENVIRONMENTAL AND SOCIAL COST-BENEFIT ANALYSIS

Environmental and social cost-benefit analysis is assessed in the negative versus positive analysis. Furthermore, the analysis considers whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable. The benefits that will be obtained from the implementation of management and monitoring plan include improved air quality, and the surrounding environment. As mentioned in Chapters 6 and 7, the benefits of the project, in terms of financial and social benefit, are substantial, the environmental and social impacts are mitigatable and the financial resources needed to mitigate the impacts are relatively small compared with the actual capital investment. This project shall have a significant impact on the economy of Tanzania, especially in the ASGM sector.

## **11.0 DECOMMISSIONING PLAN**

### **11.1 INTRODUCTION**

This is a preliminary decommissioning plan. This plan establishes feasible decommissioning schemes that can be accomplished without undue risk to the health and safety of the public and decommissioning personnel, without adverse effects on the environment, and within established guidelines and limits of the appropriate regulatory agencies. While not a detailed document, this preliminary plan will ensure that the decommissioning and ultimate disposition of the proposed project is considered during the initial design and construction of the proposed project. The preliminary plan will remain a “living document,” and revisions will be made throughout the project’s operating life. It must be reviewed periodically and revised to reflect any proposed project construction or operation changes that might affect decommissioning. Before initiating actual decommissioning activities for the project, a detailed final disposition plan will be prepared. The final plan is based on the preliminary plan and revisions. It will define specific work activities and include safety evaluations of planned decommissioning methods, new technology and the proposed project status that will result from the decommissioning program. In addition, this plan must contain sufficient information to obtain any approvals needed from the appropriate regulatory agencies to proceed with decommissioning activities.

### **11.2 AIM OF THE PRELIMINARY PLAN**

The preliminary plan serves to establish decommissioning as an important consideration from the inception of the project, during design and throughout the operation of the proposed project. The plan has the following purposes:

- i) The primary purpose of the preliminary plan is to ensure that the proposed project designers are cognizant of decommissioning during the design of the project. Thus, these choices shall be made where design choices that would enhance decommissioning are available for types of materials and system components and location of components.
- ii) Another purpose of the preliminary plan is to identify the ultimate decommissioning options and final project status. These options would be evaluated and narrowed to the decommissioning method of choice as the end of plant life is approached.
- iii) The final purpose of the preliminary plan is to demonstrate to regulatory agencies that essential aspects of decommissioning are considered as early as possible during the design of the project. The plan serves as the starting point to demonstrate that decommissioning methods, costs, schedules, and operating impact on decommissioning will be reviewed and refined throughout the operating life of the proposed project.

### **11.3 CONTENT OF THE PRELIMINARY**

The preliminary plan provides a general description of decommissioning methods considered feasible for the proposed project. The description is intended to demonstrate that the methods considered are practical and that they protect the health and safety of the public and decommissioning personnel. Design personnel should study the proposed decommissioning methods and take steps to ensure that the design incorporates features that will facilitate decommissioning. Considerations include:

- i) An estimate of workforce, materials, and costs anticipated supporting decommissioning.
- ii) A description of the anticipated final disposition and status of the proposed project and site.
- iii) A discussion demonstrating that adequate financing will be programmed for decommissioning.

- iv) Identification of records that should be maintained during construction and operation which might facilitate decommissioning, including a set of “as built” drawings.

## **11.4 PROJECT DECOMMISSIONING METHODOLOGY AND SCHEDULE**

The project proponent shall fund and implement all aspects of project decommissioning, including but not limited to, all engineering, environmental and social assessment, permitting, construction, and mitigation activities associated with the removal of the structures, in accordance with this plan and mitigation of project removal impacts on site. The project proponent shall monitor environmental and social impacts during and after project removal to respond to defined events during the monitoring phase.

- i) Decommissioning will involve, but is not limited to the specified list, because some issues or problems may surface during subsequent monitoring and audits:
- ii) The buildings will continuously be rehabilitated and renovated. While doing that, there will be solid wastes that will be disposed of according to the ESMP.
- iii) Moreover, during decommissioning, the buildings will be demolished accordingly to suit the new activity. While doing that, the rubble will be disposed of according to Chunya District Council's directions.
- iv) Employees will be terminated from their employments and to them, the future will look blunt. Three things will be observed: their contributions to the pension fund will be made monthly as required by law; a training programme will be made to advance them into apt skills and professions continuously; and the termination benefits including transport and disturbance allowances will be made.
- v) On decommissioning, the proponent will search for experts' opinions to convert the project facilities into another or other uses.
- vi) The restoration plan for the entire premises will be made by proponent including the tailing facilities on site (with expertise from environmentalists and economists) and then forwarded to NEMC for approval.
- vii) Also, the proponent shall obtain all permits required to undertake decommissioning of the Project. This basically will include Pension Fund, Chunya District Council's etc.

Project removal will begin three months after closure and continue for two months. Within the three months from closure, proponent will inventorize all components that need to be removed and or disposed of as well as restored on site. This inventory will include building structures, equipment, tailings facilities etc., to be demolished/dismantled or restored on site. Also, the mode of disposal and/or restoration will have to be finalized. This information will assist in preparing the final decommissioning plan for approval by NEMC and other relevant government bodies.

After the approval of the decommissioning plan, the metal parts will be removed first within the first three months (this is important to ensure that they are not vandalized). The second three months of the decommissioning will be used to remove concrete structures and foundations. Debris will be used as road fills for rural roads. All disturbed areas will be landscaped and re-vegetated using indigenous trees.

Project decommissioning has five phases: (1) pre-removal monitoring; (2) permitting; (3) interim protective measures; (4) Project removal and associated protective actions; and (5) post-removal activities, including monitoring of environment and socio-economic activities. The first three phases will occur before removal of the project (i.e., within the first six months). The fourth phase — project removal and associated protective actions — will occur twelve months after closing business. The fifth phase will begin after total removal and continue for at least one year. The description that follows outlines the activities that will occur in each phase:

- (1) Pre-removal monitoring: Pre-removal monitoring includes the project site's environmental and socio socio-economic status and the surroundings. This monitoring is essential to identify any environmental or social liability that needs to be settled before the permit for closure is given. This period will also be used to invent all assets and facilities that need to be disposed of or restored on site and prepare a final decommissioning plan for approval by NEMC.
- (2) Permitting: the project proponent shall obtain all permits required to undertake the removal of the project. This basically will include NEMC, Pension Fund, Chunya District Council etc.
- (3) Interim Protective Actions: This will take care of any interim protective measure that needs to be implemented to protect human health and the environment.
- (4) Project Removal: As noted above, the removal of the project will be completed within twelve months.
- (5) Post-Removal Activities: Post-Project removal monitoring will continue for one year

## 12.0 SUMMARY AND CONCLUSION

The study has scrutinized the environmental and social implications of the proposed Construction of Artisanal and Small-Scale Gold Mining (ASGM) Gold Ores Processing and Washing Facilities at Itumbi Village, Matundasi Ward, Chunya District, Mbeya Region, Tanzania. The study was conducted to comply with the Environmental Management Act (2004) and was done in accordance with the EIA and Audit (amendment) Regulations, 2018 as well as World Bank Environment and Social Framework (ESF) and the project's Environmental and Social Management Framework (ESMF) respectively. Stakeholder consultations were conducted during the study to encompass central and local government authorities, communities in the project neighborhoods and interested parties. Standard methodology for impact identification was used including checklist, matrix and professional judgement.

Based on the findings, it is evident that development of the proposed project will greatly contribute towards safeguarding the health of artisanal and small scale gold mines and the surrounding environment on the adverse health effects of mercury in the area. The Environmental and Social Impact Assessment study for the proposed project indicates that, the potential negative impacts can be easily mitigated without any major effect to the environment. However, some important resources/receptors may be affected negatively such as flora, fauna, the water resources and air as well as local community. The impacts associated with these mostly vary from negligible, low to moderate significance and can be mitigated as shown in the Environmental and Social Management plan.

The project will be implemented within the PML licensed area of Mr. Vicent Bruno Minja with existing and ongoing mining activities and thus no land compensation or resettlement for the project will be involved. The area is isolated from human settlements and thus with minimal impacts to social aspects. The area is also surrounded by mining activities of the ASG miners who are targeted group for the project. Many people of the area are likely to benefit from the project compared to those who will be affected negatively. The benefits in terms of practical knowledge to be gained will be reaped by many generations to come. The benefits will go beyond the physical project footprint areas as the demonstration facilities will also be used by regulatory bodies (RMO) as best reference for miners but also to enforce on safe use of the mercury in the area. This, in turn will save the government funds directed to health sector through treatment of citizens affected by mercury from this ASG mining sub-sector but also guaranteed the health of people in this sub-sector for maximum production hence supporting economic growth of the area and country at large.

The study concludes that a number of environmental impacts have been identified and assessed; none of these are considered to be that severe after mitigation as to prevent the further planning, design and construction of the proposed facilities. Thus, the project development in the area can be considered suitable subject to the implementation of the mitigation measures as indicated in the Environmental and Social Management Plan.

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# APPENDIX 1: PRIMARY MINING LICENSE (PML)



THE UNITED REPUBLIC OF TANZANIA  
**MINISTRY OF MINERALS**  
**MINING COMMISSION**

THE MINING (MINERAL RIGHTS) REGULATIONS, 2018  
**PRIMARY MINING LICENCE PML0671MBY**  
*The Mining Act, Cap. 123*

The exclusive right, subject to the provisions of *The Mining Act, Cap. 123* and the regulations made thereunder or which may come into force during the continuance of this primary mining licence or any renewal thereof is hereby granted to M/S **Vicent Bruno Minja** of **P. O. Box 106206, Dar es Salaam, Tanzania** (hereinafter called the Licensee), to prospect and mine for **Gold**, at **Itumbi B** in **Chunya** District, QDS **228/4** over an area described overleaf (Annex A).

This Licence, unless sooner cancelled, suspended or surrendered pursuant to the provisions of *The Mining Act, Cap. 123* shall be valid for a period of **seven (7)** years, effective from the date of grant.

Granted this ..... <sup>06<sup>th</sup></sup> ..... day of July, ..... 2021

  
.....  
Eng. Sabal I. Nyansiri  
For: **EXECUTIVE SECRETARY**

**ANNEX A**

**DESCRIPTION OF THE PRIMARY MINING LICENCE AREA**

The Primary Mining Licence is at **Itumbi B** area in **Chunya** District, QDS 228/4 defined by the following corner co-ordinates (Arc 1960):

Corner	Latitude	Longitude
1	- 08 deg 21 min 16.60 sec	33 deg 17 min 19.12 sec
2	- 08 deg 21 min 16.60 sec	33 deg 17 min 31.65 sec
3	- 08 deg 21 min 24.90 sec	33 deg 17 min 31.65 sec
4	- 08 deg 21 min 24.90 sec	33 deg 17 min 19.12 sec



Legend	
Licensed area	
License Number	<b>PML0671MBY</b>
District	Chunya
Direction	

An area of approximately **9.77** Hectares.

**ANNUAL RENT PAYMENTS**

Year	ERV	Amount (TShs.)	Date	Signature & Stamp
1.	9218605601003	879300	5/7/2021	
2.	.....	.....	.....	.....
3.	.....	.....	.....	.....
4.	.....	.....	.....	.....
5.	.....	.....	.....	.....
6.	.....	.....	.....	.....
7.	.....	.....	.....	.....

## APPENDIX 2: LAND CONSENT

HALMASHAURI YA WILAYA YA CHUNYA  
MAMLAKA MJI MDOGO MAKONGOLOSI  
AFISA MTENDAJI KATA  
KATA YA MATUNDASI,  
S. L.P 15.  
CHUNYA.  
20/07/2020.

AFISA MTENDAJI MKUU,  
MAMLAKA YA MJI MDOGO,  
S. L.P 187,  
MAKONGOLOSI.

YAH: NDUGU VICENT B. MINJA KUOMBA  
KUJENGA PLANT ENEO LA ITUMBI.  
Husika na mada tajwa hapo juu.

Tumepokea barua ya maombi toka kwa ndugu VICENT B. MINJA ya tarehe 13/07/2020 ya kutaka kujenga plant ya uchenjaji wa Makaki ya Madini ya dhahabu katika eneo lake la uchinbaji lenye namba ya Leseni PL 00052254.

Wajumbe wamekubali ujenzi huo wa plant katika hilo eneo ambalo lipo mbali kabisa na makazi ya watu na wametoa maagizo kwa mwekezaji kuzingatia suala la utenzaji wa mazingira.

Nimeambatanisha muhtasari wa kikao cha kata na muhtasari wa serikali ya kitongoji cha ITUMBI

AFISA MTENDAJI KATA YA MATUNDASI CHUNYA  
H. Sante  
  
MASHAKA EDOMU MUANJUMBE  
AFISA MTENDAJI KATA YA MATUNDASI CHUNYA

HALMASHAURI YA WILAYA YA CHUNYA  
MAMLAKA MJI MDOGO MAKONGOLUSI

MUHITASARI WA KIKAO CHA KAMATI YA MAENDELEO  
KATA YA MATUNDASI OMBI LA NDUGU

AGENDA

01. KUFUNGUWA KIKAO.
02. KUJADILI OMBI LA NDUGU VICENT B. MINJA LA KUJENGA PLANT.
03. MENGINEYO
04. KUFUNGA KIKAO.

AGENDA 1: KUFUNGUWA KIKAO.

Mwenyekiti alifungua kikao mnamo saa 4:00 Kamili asubuhi, kwa kuwakaribisha wajumbe kwenye kikao na kuwaomba uvumilivu tangu mwanzo hadi mwisho wa kikao na alitolea ufafanuzi yeye kukaimu nafasi ya Mheshimiwa Diwani baada ya muda wa kazi kuisha na kuingia kwenye mchakato wa uchaguzi.

Baada ya kusema hayo alikifungua kikao rasmi na kukiacha wazi.

AGENDA 2: KUJADILI OMBI LA NDUGU

Katibu aliwasomea wajumbe barua ya maombi ya kujenga Plant ya kuchenjulia dhahabu ya ndugu VICENT B. MINJA katika mtaa wa Itumbi kwenye eneo lake la uchiimbaji lenye namba ya Leseni PML 000522 SWZ

MAAZIMIO YA WAJUMBE

- Wajumbe walitaka kujua kama ndugu VICENT B. MINJA atakuwa tayari kushiriki shughuli za maendeleo ITUMBI na kata ya MATUNDASI
- Pia wajumbe walimtaka ndugu VICENT B. MINJA kuchangia ununuzi wa SIM TANK Zahanati ya Matundasi

## MAJIBU

-Ndugu VICENTI B. MINJA alikubali kuwa moyo wote kwamba atakuwa tayari kushiriki shughuri za maendeleo katika mtaa wa Itumbi na kata ya Matundasi.

-Pia ndugu VICENTI B. MINJA alikubali pindi akianza uzalishaji wa dhahabu atatekeleza haraka agizo alilo Pewa la Kunuma SIM TANK kwa ajili ya Zahanati ya Matundasi.

Baada ya Majadiliano ya muda mrefu wajumbe kwa pamoja walikubali ombi la ndugu VICENTI B. MINJA kujenga plant kwa ajili ya Kuchenjulia madini ya dhahabu kitongoji/mtaa wa Itumbi na kunitaka azingatie na kufuata sheria zote za utunzaji wa Mazingira na kufuata maagizo mbalimbali yatakayotolewa na wataalamu wa Afya na Mazingira.

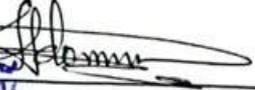
### AGENDA 3. MENGINE YO.

Wajumbe hawakua na ya ziada ila walisisitiza ndugu VICENTI B. MINJA kutekeleza maagizo aliyopewa.

### AGENDA 4. KUFUNGA KIKAO.

Mwenyekiti aliahiisha kikao mnamo saa 5:00 Kamili Asubuhi kwa kuwashukuni wajumbe kwa ushiriki wao tangu mwanzo hadi mwisho wa kikao. Aliwasihi wajumbe kuwa makini kipindi hiki cha uchaguzi kwa kujiepusha na Rushwa.

  
**PEIER BUHABI**  
MWENYEKITI

  
**MASHAKA EDMU MWANJUNGA**  
KATIIBU - WEO MATUNDASI

MAHUDHURIO YA KIKAO CHA WDC

KATA YA MATUNDASI 20/07/2020

	JINA LA MUMBE MUDA	CHEO	SAAHIHI
01	PETER M. BUKABI	9:00 M/KITI	Butabi
02	MASHAKA EDOMU MWANJUMBA	9:00 WEO-MATUNDASI	<del>Shamba</del>
03	SHASSANT HASSANT MUKOMA	9:00 M/KITI KISIMANI	Mukoma
04	GIFT JOHNSON MWAIEDIMOLE	9:00 KATIBU KISIMANI	Mwai Edimole
05	REHEMA A. MLAMBALALA	9:00 M/KITI "A"	RA. mlambalala
06	SHANI A. NGOMA	9:00 AFO MATUNDASI	Shani
07	ERICK J. MSOMBA	9:30 H/M-MAKALASA	Shamba
8	SHAMBA JUMA	3:30 M/KITI MATUNDASI	Shamba
9	AMENYE KIASOMBO	5:36 MUMBE	Amenye
10	JORAN KABELERE	3:30 MUKITI KIKICI	Joran
11	THEOPHIL BONIFASI KAMBIMBAYA	3:00 KIKIKISA	By.
12	WESTON B. SINGWA	3:30 MCH. MOR.	Weston
13	ENANWELI-R-LWESHA	3:30 MCH. MOR.	Enanweli
14	NAYSON W. MBUGWA	3:30 KATIBU MATUNDASI	E.R. Mbugwa
15	ATHUMANI SULEIMAN	3:30 SHEHE-MATUNDASI	Athumani
16	TIMOTH R. MITOBESI	3:30 AFISA TABIBU	Mitobesi

MISA MIENIA  
ATA YA MATUNDASI  
HUNYA

MUHTASARI WA KIKAO CHA SERIKALI YA  
KITONG'OI KUJADILI MAOMBI YA PLANT

: AGENDA

1. KUFUNGA KIKAO
2. KUJADILI MAOMBI YA PLANT
3. KUFUNGA KIKAO

: AGENDA 1. KUFUNGA KIKAO

Mwenyekiti alifunga kikao Sac 4:10 asubui kwa kushuhuru wajumbe kwa mahuchulis yao na kuwataka wame watulivu kwa mda wote wa kikao

: AGENDA YA 2: KUJADILI MAOMBI YA PLANT

Katibu alisoma agenda hiyo na Mwenyekiti akatoa ufafanuzi na kumtaka katibu awamo barua ya maombi kutoka kwa ndg: VICENI B. MINJA ambaye ameleta barua ya maombi ya kujenga plant kwenye eneo lake la Uchimboji lenye namba ya leseni Pmt 000522 SWZ lililopo hapa itumbi. Baada ya hapo wajumbe walijadili maombi maombi hayo na kukubali ombi lao.

Katika majadiliano wajumbe wakwazimia Mwombaji ndg VICENI B. MINJA atoe pesa milioni moja (1,000,000) kama mchango wake wa Maeuteleo ya kitongoji ambapo mwombaji ndg VICENI B. MINJA alikubali na kutoa pesa hiyo tarehe 16/07/2020 Pesa hiyo ni kwa ajili ya Ujenzi wa Ofisi itumbi

*Katibu*  
FISA NTENDAJI  
KITONG'OI CHA ITUMB

AGENDA: 3 KUFUNGA KIKAO

Mwenyekiti alikahitisha kikao Mnamo  
Saa 6:27 Machana kwa kishukulu wajumbe  
Waliohudhuria kikao na kuwapongeze  
kwa Ujumilivu wao

*Puhati*  
MESTERATIWA KIKAO  
ITUMBE  
16/07/2020

MWENYEKITI

*Pauliso*  
MESTERATIWA KIKAO  
ITUMBE  
16/07/2020

ICATIBU

KIKAO CHA SERIKALI YA KIIONGOJI KWAADI MAOMBI

YA PLATI 16-07-2020

MATHURIO

1. P JINA KAMILI	WADHIFA	MUDA	NO-SIMU	SAAHIH
1. PETER M. BUTABI	Mwamba	4:00	0628785557	Paulis
2. REHEMA -A. CHAPALLINGE	KATIBU	4:02	0655119179	Paulis
3. TITO SAMWELY	MJUMBE	4:05	0627 684081	Jmf
4. MAGDALENA MUSSA	Mjumba	4:05	0623 003211	Musa
5. NEHEMIA KAMARI	Mjumba	4:08	0712-750919	Paulis
6. Hassani Ndakwa	Mjumba	4:33	0766177517	Paulis
7. Bernard Aroni Mwalukosa	Mjumba	4:34	0621369366	Paulis
8. MONICA - KAPONDA	Mjumba	4:36	0762506320	AA

*Paulis*

AFISA NTENDEJI  
KIIONGOJI CHA KIIONGOJI

Ywenzekiti Itumbi:

Shughulikia ombi la mwananchi  
huyo na unilettee mapendekezo  
yako na kata to Matundasi.

MAMLAKA YA NJI MDOGO  
MAKONGOROSI  
J. E. O. NTA  
13.07.2020.

VICENT B. NTINJA  
KATA YA MATUNDASI  
KITONGOJI CHA ITUMBI  
S. L. P. 15  
CHUNYA - MBEYA  
13 JUL 2020

MKURUGENZI  
MAMLAKA YA NJI MDOGO  
MAKONGOROSI  
S. L. P. 187  
CHUNYA - MBEYA

TANZANIA

YAH. MAOMBI YA KUYENGA PLANT  
KATIKA KATA MATUNDASI  
KITONGOJI CHA ITUMBI

Rejia somo husika hapo juu nimi ni mkaazi  
wa kata ya Matundasi, Mamlaka ya nji mdogo  
makongorosi.

Naomba kibali cha kuyenga plant kwa ajili  
ya kucherijulia mchanga wa madini ya  
dhalabu. Naahidi kuingatia maadokeso  
ya kiutawala na kitaaluma yanayohu-  
siana na shughuli za plant ambazo mimi  
naomba kuyenga.

Naleta kwako kwa hatua sit

nimi  
Vicent B. Ntinja  
13 Jul 2020

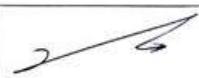
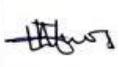
## APPENDIX 3: STAKEHOLDERS CONSULTED AND THEIR SIGNATURES

Environmental and Social Impact Assessment for the Proposed Construction of ASGM Gold Ores Processing and Washing Facilities at Sangambi and Matundasi Villages in Chunya District, Mbeya Region, Tanzania

### Name and Signature of Consulted Stakeholders

DATE/TAREHE	NAME/JINA	INSTITUTION/TAASISI	ADDRESS/SIMU	SIGNATURES/SAHIHI
18/09/2023	TANUM H. KAMBANDA	CHUNYA P.C	0715589370	
—//—	YOHANA NGULUUA	DENSO CHUNYA DC	0724710181 0753122660	
—//—	FRIEDRICH G. MSOLA	WED-SANGAMBI	0756414090	
—//—	FREDDY S. MATIASA	AFISA MADINI - SANGAMBI	0963257532	

### Name and Signature of Consulted Stakeholders

DATE/TAREHE	NAME/JINA	INSTITUTION/TAASISI	ADDRESS/SIMU	SIGNATURES/SAHIHI
22/09/2023	FATON USWELE	OSHA-SHE	PO-Box 880 MBY 0754334634	
22.09.2023	DR-RAJAN MAMEO	OSHA-SHE	0712750999	
22/09/2023	EMILAS Z. MULIMBA	GCLA-SH20	0713 419612	
22/09/2023	SIVA MAMIRO	LEBWB	0757 610061	

**Name and Signature of Consulted Stakeholders**

DATE/TAREHE	NAME/JINA	INSTITUTION/TAASISI	ADDRESS/SIMU	SIGNATURES/SAHIHI
19/09/2023	Eng. SABAI I. NYANSIRA	RESIDENT MINES OFFICER (RMO) CHUNYA.	0756247821	
—//—	LEONARD MANYESHA	MIBOZEMA (M)	0713810766	
19/09/2023	Philip Sebastian	Vicuna Boma Mining Owner of PML	0784781681	
19/09/2023	STANLEY MPOJI	MINERAL PROCESSING ENGINEER RMO - CHUNYA.	0767773759	
19/09/2023	MASHAKA E. Mwanjuma	CHUNYA DC WEO - MATUNDASI	0755101093	
19/09/2023	A/INSP MALIGENDE	POLISI KATA	0759428659	

PARTICIPANTS REGISTRATION FORM: Stakeholders Meeting  
 ACTIVITY: Environmental And Social Impact Assessment for proposed ASGM Gold Ores Processing and Washing Facilities  
 DATE: 19/09/2023  
 VENUE: Itumbi Hamlet office

NAME/JINA	SEX F/M	AGE GROUP A= 18 - 35 B= 36 - 45 C= 46 - 60	POSITION/ DESIGNATION	ORGANISATION	CONTACTS	SIGNATURE
Berard Aron	ME	C	Katibu Itumbi	KITONGO CHA ITUMBI	0682318800	
Elyud-William	ME	G	mJumbe	Itumbi matunda	0682316812	
Jwoti SAGA	KE	A	mJumbe	Itumbi matunda	0786619515	
MAMBO LUCAS	ME	C	MJUMBE GETA	ITUMBI	068585685	
LUCAS NRAMBA	MG	C	FAIZORA	ITUMBI	0687599860	
ANEHJELADI	KE	B	BALOZI	ITUMBI	078688218	



PARTICIPANTS REGISTRATION FORM: Stakeholders Meeting  
 ACTIVITY: Environmental And Social Impact Assessment for proposed ASGM Gold Ores Processing and Washing Facilities  
 DATE: 19/09/2023  
 VENUE: Itumbi Hamlet office

NAME/JINA	SEX F/M	AGE GROUP A= 18 - 35 B= 36 - 45 C= 46 - 60	POSITION/ DESIGNATION	ORGANISATION	CONTACTS	SIGNATURE
Kasian Alphonse Semiono	m	C	mjumba	Itumbi	0624751211	
Mohamed R. Senga	m.	C	mjumba -	Itumbi	0625975575	
EVASINA H. MBELWA	m	C	VI-MALUM	ITUMBI	0786135548	E. MBELWA



## APPENDIX 4: DETAILED STAKEHOLDER'S VIEWS AND CONCERNS

The formed team of consultants undertook stakeholder's consultation to ensure key project stakeholders are fully involved with the project. The stakeholders consulted include: - Chunya District Council-Director's office, Regional Mines Office – Chunya, Occupation Safety and Health Authority (OSHA)-Southern Highland Zonal office, Government Chemist Laboratory Authority (GCLA) - Southern Highland Zonal office, Lake Rukwa Basin Water Board – Director's office, Mbeya Regional Miners Association, Matundasi Ward office, Itumbi village office and the Itumbi village members. Below are the views and concerns from the consulted stakeholders;

### Chunya District Council

The team of consultants visited the Chunya District Council and met with Mr. Tarim H. Kambona, the District Executive Director and District Environmental Management officer, Mr. Yohana Ngulukia. The following were the views and concerns from the Director regarding the proposed project:-

- i) The Director informed the team that, the production of gold is very high especially for small scale miners which reaches an average level of 300kg per year as the sector provides livelihood to most residents of the District and income to the government.
- ii) Awareness should be provided about the benefits of the project and explained the effects undertaken on the safe use of mercury, especially to protect human beings and the environment;
- iii) The Director noted that mercury is widely used and it is impossible for miners to get away of it unless the alternative technology is better in terms of affordability, easy in usage and less expensive compared to mercury;

- iv) One of the factor is cheap and readily available mercury hence it is not possible miners to think of other alternative which is expensive unless the importation of mercury is raised to make it expensive so that they can adopt to alternatives to safeguards their health effects due to misuse of it.
- v) The Director advised that, there should be collaboration with the District office throughout the project implementation;
- vi) The new approach should demonstrate to small scale miners in terms of output i.e. efficiency for easy adaptability of the approach.
- vii) One of the key challenge for small scale miners is water scarcity especially for gold processing and washing and thus the project should take into account this challenge.
- viii) The Director advised that, a geological survey should be carried out and final information should be provided to small-scale miners who deal with minerals in order to formalize the small-scale mining sector and bring productivity to the development of the relevant surrounding communities.
- ix) Also advised the for involvement of Regional Miners Associations (REMAS) in the ESIA process and entire project;
- x) The Director acknowledge on challenge of GBV issues in the mining sector where key issues noted include many children to be engaged in small-scale mining thus leading to drop out from schools, sexual harassment, child neglects, and also issues of HIV/AIDs.
- xi) The Director note that there is no major land related conflicts from the mining areas and explained the modality used, if the area belongs to the village council then 30% is allocated to the village for development activities and 70% will remain for the producer-operator and the owner of the production facilities and this is after all government royalties have been deducted from each gold quantity that was produced at the site.

#### **District Environmental Management Officer (Demo)-Chunya**

The team consultants held a meeting with DEMO, Mr. Yohana Nguruko. The officer had the following views and concerns regarding the proposed project;

- i) The officer acknowledged the importance of introduction of gold processing and washing bay as demonstration Centre for safe use of mercury noting that this will reduce the effects of mercury on the environment and human health. Further, he noted that other earlier efforts of alternative technologies (like cyanide and Borax) have not been feasible as they require large feedstock (gold ores) and large capital investment that artisanal small scale miners can not afford.
- ii) Most miners are aware of the health effects of Mercury however without feasible alternatives no one can avoid using mercury as mining is part and parcel of their livelihoods. Normally they say that Money first health later. Hence this could be a solution to the miners as mercury usage is the only preferable means for processing gold ores.
- iii) The officers advised washing resultants effluents should have proper management like containment ponds to avoid direct discharge to the open environment.
- iv) The officer also advised that, there should be regular sampling for monitoring purpose to ensure the operation does not impact the surrounding environment.
- v) The operation area should be fenced to avoid interactions with other human activities like grazing and hence to reduce the level of impacts.
- vi) The officer advised that, a thorough discussion should be held to get a common understanding on the operation models that will be used to run the proposed ASGM Gold processing and washing facilities in order to avoid conflicts that may arise between the operator of the facility and the small miners of the area.
- vii) Also, advised that there should be clear understanding on the fate of the tailings belonging/ownership after the process. To clarify further on this, the facility will allow individua miners to bring the gold ore to process and the fate of ownership of the tailings which still are

regarded as worth need to be defined by the project to avoid misunderstanding and potential conflicts during operation of the facilities.

- viii) Finally the ownership status of the facilities after end period of the project need to be defined to avoid potential conflicts while maintaining sustainability of the project/facility on the respective areas.

### **Resident Mines Offices (RMOs) -Chunya, Mbeya**

The team of consultants held a meeting with Eng. Sabai I. Nyansiri, a Resident Mines Officer at Chunya, Mbeya. The following were the views and concerns on the proposed project;

- i) The project is important for compliance issues of environment and occupational health and safety (OHS) of miners and hence for safeguarding the miners health and surrounding environment.
- ii) The officer further noted that one of the challenge the office is facing is to ensure compliance on those key aspects of OHS and environment, hence with this project we expect will enhance voluntarily compliance and will easy enforcement by mine inspectors as miners will have already physically seen how to comply.
- iii) It was also discussed on ownership of the project facilities for sustainability after ending of the project time. The officer advised that, this should be well thought of by project implementation team to ensure sustainability. An option of considering STAMICO was given for further digestion and consideration.

### **Occupation Safety and Health Authority (OSHA)**

The team of consultants consulted Occupation Safety and Health Authority (OSHA) - Southern Highland Zone office specifically on the occupation health and safety aspects at the work place of which the Authority is dealing with. Consultation was done with Zonal Manager, Mr. Faston Uswege and Dr. Rajab Mambo. The officers provided the following guidance to ensure the proposed project is in compliance with OHS Act, 2003;-

- i. The proponent or contractor is required to submit drawing of the proposed building of the facility for scrutiny on occupational health and safety aspects by the Authority. Based on the scrutiny OSHA will recommend areas for improvement (if any).
- ii. Once drawings are approved, the contractor engaged for the project construction is required to be registered with OSHA (if not registered), if the contractor is already registered then is required to register the project work place. The registration is done through online WIMS as longer the applicant is having TIN, Business License and Certificate of Incorporation.
- iii. The contractor is required to comply with minimum requirements of the Occupational Health and Safety Act, 2003. These include;-
  - a. Having Health and safety policy of the company
  - b. Undertake Baseline Risk Assessment of the workplace to identify key hazards and institute measures to mitigate the hazards
  - c. Designate one staff to be safety representatives (SHE - Rep) and ensure the staff attends SHE - Rep training from OSHA
  - d. Also, appoint one staff to be first aider and ensure the staff attend a training of first aiding
  - e. Provision of safety gears based on identified risks
  - f. Ensure the workplace is having first aid kit with all its essentials
  - g. The workplace should have conducive sanitary facilities (i.e. toilets) for both sex and appropriate to the numbers of workers.

- h. There should be changing rooms for both sex
  - i. Workers should undertake pre-employment medical examination, once per year medical examination during engagement and post-employment medical examination.
- iv. OSHA will undertake mandatory inspection at work place that will include industrial hygiene, electrical and general inspection to gauge compliance level of the contractor and if there are areas for improvement recommendations will be made and action plan for addressing the recommendations will be required to be prepared.
  - v. Finally, if minimum requirements are met compliance certificate will be issued which is valid for one year.
  - vi. During operation, the proposed is required to register the new workplace with OSHA through online system known as WIMS. Also, will be required to undertake Baseline Risk Assessment and other requirements as noted under the contractor part until a minimum requirements are met and Compliance certificate will be issued thereafter.

Key issues noted for the small scale miners include;- conducting hazard operations with PPEs and unsafe operations in the mine pits. Also, the doctor clarified that the medical examination which is undertaken is symptoms based i.e. lubb test is done to see if a worker is breathing normally and if there is a need for samples are taken for laboratory unless at the GCLA.

### **Government Chemist Laboratory Authority (GCLA)**

The team of consultants visited the Government Chemist Laboratory Authority-Southern Highland Zonal office in Mbeya as one of the stakeholders. The authorities is in-charge for control importation, transportation and use of industrial chemicals. Mercury to be used is one of the Industrial chemical hence their relevance to the project. The team held discussion with the Zonal Manager, Mr. Elias Z. Mulima. The following were the views and concerns on the proposed project;

- i) The officer noted that, Artisanal Small-scale gold miners are not aware on the health effects related with mercury use, therefore, sensitization and provision of alternative approach of using mercury is important to safeguards the health of users.
- ii) The team informed that, amount of mercury is very high especially in regions with a high concentration of small-scale miners. Additionally, the amount of mercury is sold in secret rather than being permitted to sell and buy in the open market, he also added that, the GCLA is encouraging miners to register all amount of mercury imported and exported in order to have control;
- iii) The existing washing bays do not have a storage room for the chemicals used in their operations, therefore, the proposed construction of ASGM Gold Ores Processing and Washing facilities need to be well designed to accommodate all supportive components to include proper room for storage;
- iv) Finally, the officer acknowledged the project implementation and he also added that, the introduction of gold processing and washing bay as demonstration Centre that use mercury safely, will reduce the effects of mercury on the environment;

### **Lake Rukwa Basin Water Board (LRBWB) - Mbeya region**

The team of consultants visited Lake Rukwa Basin Water Board office at Mbeya, which is mandated to manage, protect, develop and allocate water resources within the basin as stipulated under Water Resources Management Act No. 11 of 2009. Lake Rukwa Basin is a fairly large basin which comprises parts of the administrative regions of Mbeya, Rukwa, Tabora, Songwe and Katavi. The team held a meeting with Ms. Siya Julius Mamiro, the Basin Environmental Management officer and below are views and concerns on the project;-

- i) The officer advised that the project should ensure to acquire borehole permits for both water abstraction (if this will be applicable) and monitoring boreholes for the facilities.
- ii) The officer also advised for the project to acquire a permit for construction of the Tailing Storage Facilities (TSF) from Dam Safety Section of the Ministry of water.
- iii) The facility should be located away from the water sources/bodies and this has been a major challenge with small scale miners as some do conduct the activities either in the river or close to the rivers leading to high pollution load to the water bodies.
- iv) The officer advised to have a realistic monitoring period for the boreholes of the area.
- v) The officer advised that if there will be transfer of ownership of the facility the Basin water Board - office should be notified based on the liability of permits issued by the Board.
- vi) The decommissioning plan should include to restore the area close to its original conditions, further the fate of the stockpiled materials and tailing storage facilities should be well defined.

### **Mbeya Regional Miners Association (MBEREMA)**

The team of consultants held a meeting with Mr. Leonard Manyesha, the Chairman of MBEREMA. The following were the views and concerns on the proposed project;

- i) The chairman acknowledge the relevance of the project as it will provide a chance to the small-scale miners to imitate and build their own washing bay of the same nature for the protection of human health and the environment. Further he noted that Mercury method for gold ore processing is the easiest and the government should not ban its use.
- ii) Also he informed the team that, In Mbeya region, every artisanal and small-scale gold miner use mercury for gold recovery anywhere, even at home, because it is difficult for small miners to process gold at one place due to capital investment required to do so.
- iii) One challenge the chairman posed is that the need for such demonstration is huge as the areas of Artisanal miners are wide spread in the District and beyond and thus this will just reach few areas and few people compared to the magnitude of the problem/needed area.

### **Vicent Minja-Primary Mining License (PML) Owner**

The team visited the PML owner office at Itumbi Mlimani area, Itumbi Village, Matundasi ward and the team met with Mr. Philip Sebastian, a PML owner representative. The following are his views proposed project; -

- i. The team was informed on ongoing efforts in collaboration with TANESCO to extend the Grid to the project area and hence to benefit to small-scale miners community of the area the aspect of which will reduce operational costs but also will improve production in terms of quality and quantity;
- ii. Mr. Philip also clarified to the team that, there is no land dispute since all legal procedures for acquiring surface right have been followed and there is land ownership document (Village Minutes) in place for the PML including the area intended for the project;
- iii. Also, he confirmed that, there will be no interference with other operations within the PML as there is huge enough land for other activities.
- iv. The project is highly needed and we plea for it to start as soon as possible
- v. Mr. Philip Sebastian acknowledged the stakeholders participation including himself at the early stage of project implementation and he plea for hastened process to allow ythe proejcy to start as soon as possible.

## **Matundasi Ward**

The team visited the Matundasi Ward Office where the proposed project will be located administratively and held a discussion with Ward Executive Officer, Mr. Mashaka E. Mwanjunga and Inspector Maligende, a Ward Police Officer. The following were the views and concerns on the project:

- i. The officers acknowledged the importance of the project in the area bearing the huge usage of Mercury without due care to their health and environment.
- ii. The officers also noted that, the degraded area around the project site due to mining activities should also be rehabilitated so as to give an example not only of the safe way of using mercury in the gold ore processing but also how the degraded area can eventually be rehabilitated and become suitable for other usage. Thus, should be an example area for the small scale miners.
- iii. The team was informed that, the area is officially recognized as an area for artisanal and small-scale miners and there has been no land related issues.
- iv. On GBV issues the team was informed that, there is a committee to protect and defend children, women against sexual violence known as MTAKUWA. It is below WDC/MW. The committee usually meets on monthly basis;
- v. It was noted the GBV common cases in the area include;- Rape of children, couple physical violence, Early pregnancies, child neglect,
- vi. The officer advised the contractor to give priorities to local communities for employment during project construction phase. Further, the office promised the cooperation to all project implementation phase.

## **Itumbi Village**

The team of consultants' visited the Itumbi village office and thereafter held a meeting with the village members in presence of their leaders i.e. village chairman and village executive officer Mr. Benard Aron and Ms. Aneth Jelard. The village members mostly asked questions to undertake undertand about the project set up, processes and ownership as well as its intended benefits to the intended beneficiaries. All these were clarified by the consultant team as well as representative of the Regional Mine Office. Members also noted that since the area earmarked for the facility is far from the community center and residential area impacts related to noise, dust, vibration etc. are not issues of concerns. Thereafter the members were positive and in support of the project in their area. key issues noted include;-

- i. Once individual delivers the gold ore for processing at the facility and come up with the amalgamated concentrate what will be the fate of the gold ore remains? Will it be allowed to take it for further processing elsewhere or it will be required to surrender at the facility?
- ii. What will be the costs for processing the gold ores or it will be covered by the project?
- iii. The members suggested that the project should not deviate from the operation procedures and or, system that is currently in use in respective areas where the facility is intended to be developed.
- iv. Also members advised for the contractor to be engaged to cooperate with miners nearby the area;
- v. Members highlighted that, the sluicing table should be more widened to allow high gold recovery during washing process;
- vi. Finally, members accepted the proposed project and promised the cooperation to all project implementation phase.



## APPENDIX 5: SCREENING DECISION



THE UNITED REPUBLIC OF TANZANIA  
VICE PRESIDENT'S OFFICE  
NATIONAL ENVIRONMENT MANAGEMENT COUNCIL  
(NEMC)



*In reply please quote:*  
Ref. HC.145/259/19/01

21/03/2024

M/S VICENT BRUNO MINJA,  
P.O.Box 106206,  
**DAR ES SALAAM.**

**RE: SCREENING DECISION FOR THE PROPOSED ESTABLISHMENT OF ARTISANAL AND SMALL-SCALE GOLD ORE PROCESSING AND WASHING FACILITIES AT ITUMBI VILLAGE, MATUNDASI WARD, CHUNYA DISTRICT IN MBEYA REGION**

Please refer to the heading above,

2. We acknowledge receipt of the Project Brief and Payment of the Registration fee through the online Project Management System on 13<sup>th</sup> March 2024 for the above-mentioned project. The project has been allotted **Application Reference Number (ARN) EC/EIA/2024/9818**. Please quote this number in all future correspondences for this project.
3. The Council has screened the received document and according to the third schedule of Environment Management Act Cap 191 reading together with the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018 the proposed project falls under Type B2 projects, a list of projects of medium impact which can be examined in Detailed Project Brief Study. The submitted Detailed Project Brief will be reviewed and if found adequate to guide operations of the project then recommendations for issuance of EIA Certificate will be forwarded to the Minister for his consideration to sign the EIA Certificate.

---

Southern Highlands Zone Office, NHIF Building, Second floor, Karume Avenue, P.O . Box: 6215 Mbeya  
Phone 0800110115, Email Address: [nemcmbeya@nemc.or.tz](mailto:nemcmbeya@nemc.or.tz) Website: [www.nemc.or.tz](http://www.nemc.or.tz)

4. Attach all important documents and consult key stakeholders including local government authorities (LGAs), Government Chemist and Laboratory Authority (GCLA) and Resident Mines Office - Chunya include the names and signatures in the Detailed Project Brief report. These documents must also be attached to the improved final documents before you upload them to the system and submit six (6) hard copies to the NEMC – SHZ for review.
5. To facilitate the review process, you are required by the law to pay the review fee as stated in the invoice that will be provided to you through the online Project Management System.
6. After receiving payment, officers from NEMC – SHZ in collaboration with the Environmental Management Officer from Chunya District Council will organize a site verification for the rapid assessment of baseline conditions provided and consultation with key Stakeholders in the project area. Transport logistics from the office to the project site and return to the office will be arranged by you.
7. Please contact the office for any clarifications. Looking forward to hear from you and your cooperation.



J.M. Murunya

**For: DIRECTOR GENERAL**

# APPENDIX 6: SOIL AND WATER ANALYTICAL RESULTS FROM PML0671MBY, ITUMBI AREA IN CHUNYA DISTRICT



THE UNITED REPUBLIC OF TANZANIA  
VICE PRESIDENT'S OFFICE  
NATIONAL ENVIRONMENT MANAGEMENT COUNCIL  
(NEMC)



## Laboratory Analysis Report

Client: EHPMP

Date: 4 January 2026

Sampling Location: Itumbi ASGM Washing Bay Site

Equipment: iCE™ 3300 AAS Atomic Absorption Spectrometer (AAS) + VP100 Vapour Generator

### 1. Water sample

S/N	Parameter	Unit	Results	Method
1	pH	-	7.84	Electrometric
2	Copper (Cu)	mg/l	<0.01	AAS
3	Lead (Pb)	mg/l	0.010	AAS
4	Zinc (Zn)	mg/l	<0.01	AAS
5	Cadmium (Cd)	mg/l	<0.01	AAS
6	Chromium (Cr)	mg/l	<0.01	AAS
7	Nickel (Ni)	mg/l	<0.01	AAS
8	Mercury (Hg)	mg/l	<0.01	Cold Vapor AAS

### 2. Soil Sample

S/N	Parameter	Unit	Results	Method
1	pH	-	7.01	Electrometric
2	Copper (Cu)	mg/kg	1.831	AAS
3	Lead (Pb)	mg/kg	1.642	AAS
4	Zinc (Zn)	mg/kg	16.872	AAS
5	Cadmium (Cd)	mg/kg	2.112	AAS
6	Chromium (Cr)	mg/kg	6.432	AAS
7	Nickel (Ni)	mg/kg	15.312	AAS
8	Mercury (Hg)	mg/kg	0.05	Cold Vapor AAS

#### ANALYST

Name: DIONIS LYAKURWA

Signature: [Signature]

Date: 04/01/2026

#### CHECKED BY

Name: DOREEN KANILE RUBARATUKA

Signature: [Signature]

Date: 04/01/2026

Head Office, Kambarage Tower, 6<sup>th</sup> Floor, P.O. Box 2724, Dodoma. Phone: +255 262960098, 0713608930.  
Email Address: dg@nemc.or.tz Website: www.nemc.or.tz

# APPENDIX 7: BOREHOLE WATER ANALYTICAL RESULTS FROM PML0671MBY, ITUNYA AREA IN CHUNYA DISTRICT.

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School of Engineering and Environmental Studies

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<http://www.aru.ac.tz>

FAX: (255-022) – 277 5391

## ENVIRONMENTAL ENGINEERING LABORATORY

### Water Analysis Results

Client: NEMC  
Date: 26 January 2026  
Source: Water

S/N	Parameter	Unit	Results
1	pH		7.59
2	Copper	mg/l	<0.01
3	Lead	mg/l	0.016
4	Zinc	mg/l	<0.01
5	Cadmium	mg/l	<0.01
6	Chromium	mg/l	<0.01
7	Nickel	mg/l	<0.01

Sampling done by: Client,

Reporting Officer

Ndimbo A.M



# APPENDIX 8: SOIL ANALYTICAL RESULTS FROM PML0671MBY, ITUNYA AREA IN CHUNYA DISTRICT.

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School of Engineering and Environmental Studies

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<http://www.aru.ac.tz>

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## ENVIRONMENTAL ENGINEERING LABORATORY

### Soil Analysis Results

Client: NEMC  
Date: 26 January 2026  
Source: Soil

S/N	Parameter	Unit	Pit Soil	Surface Soil
1	pH		6.61	6.99
2	Copper	mg/kg	2.015	2.010
3	Lead	mg/kg	2.252	5.074
4	Zinc	mg/kg	23.678	18.716
5	Cadmium	mg/kg	2.583	3.566
6	Chromium	mg/kg	5.759	4.116
7	Nickel	mg/kg	13.628	7.970

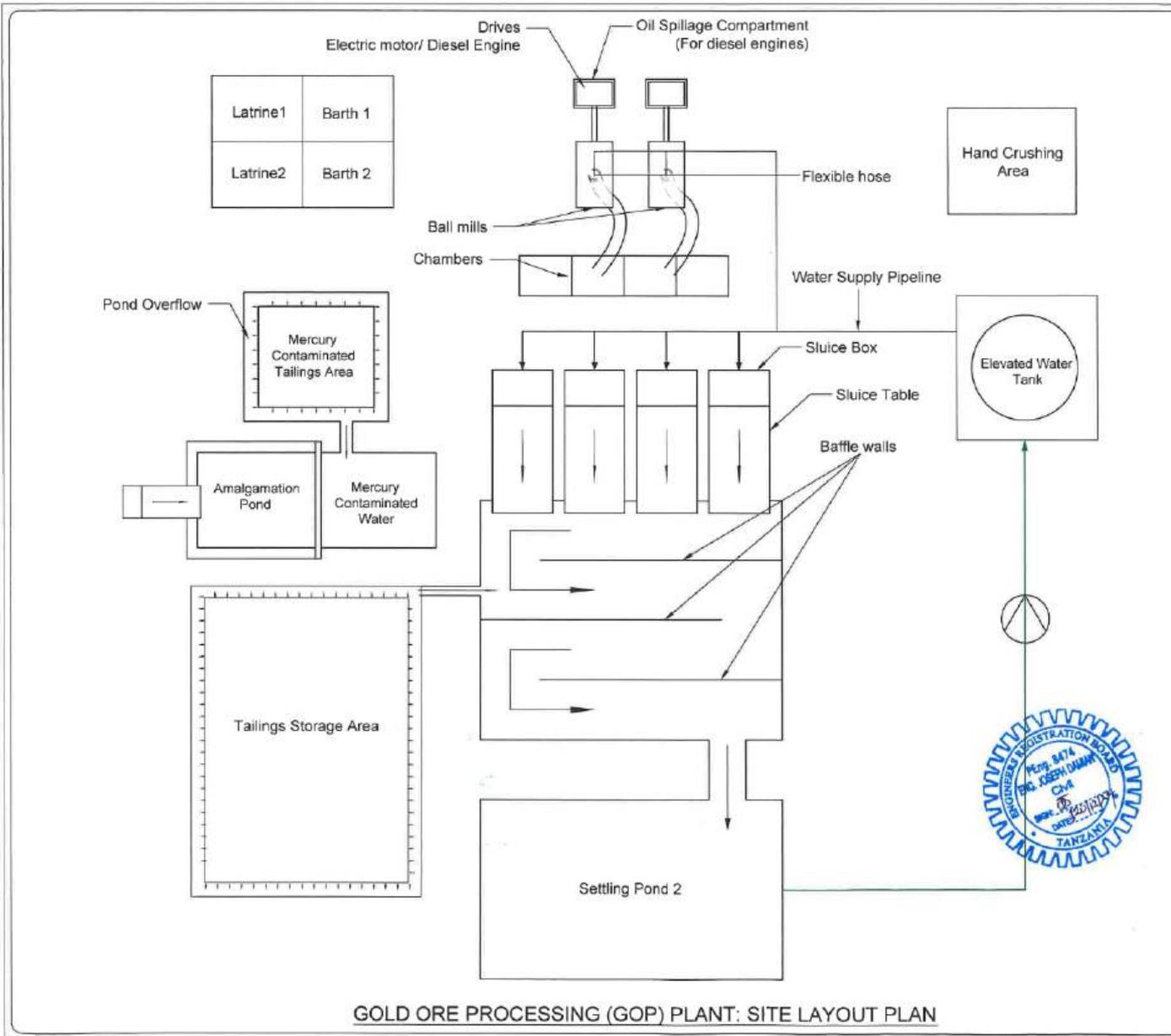
Sampling done by: client,

Reporting Officer

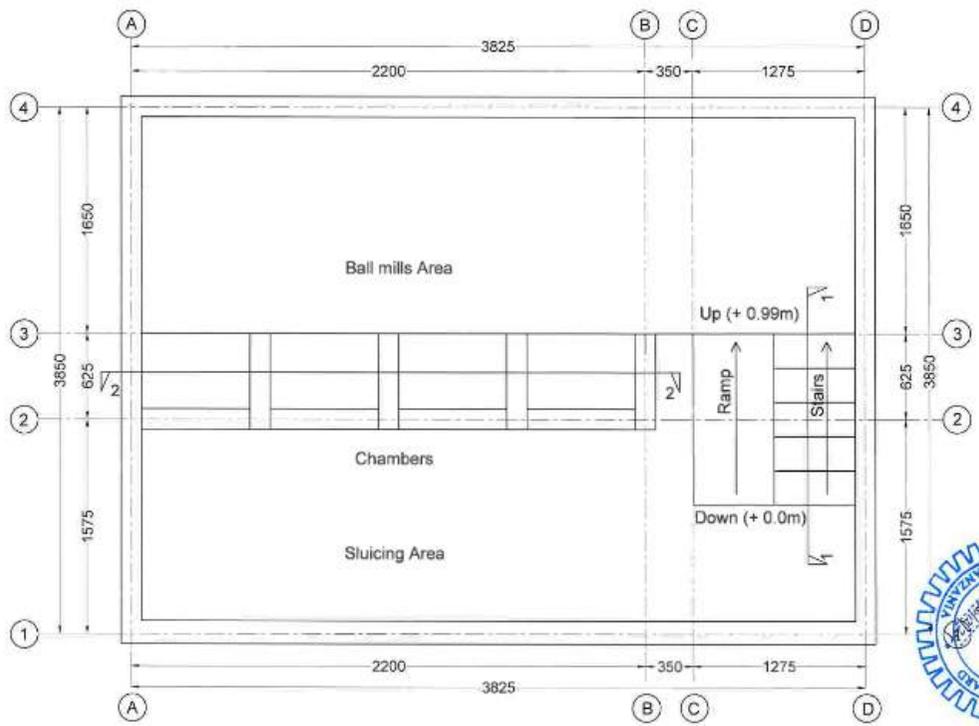


Ndimbo A.M

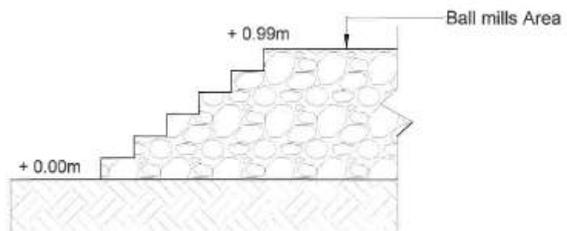
# APPENDIX 9: SITE LAYOUT PLAN



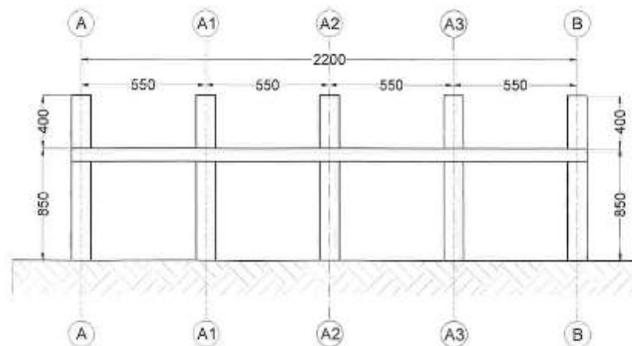
**APPENDIX 10: PROJECT DRAWINGS**



MILLING AREA; SCALE 1:30



SECTION 1-1; SCALE 1:30



SECTION 2-2; SCALE 1:30



**PROJECT TITLE:**  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Mwanza, Gella, Singida, Mbeya and Shinyanga

**DRAWING TITLE:**  
Milling Chamber Details

**NOTES:**  
1. All dimensions are in millimeters unless otherwise stated.  
2. All levels are in meters above mean sea level.  
3. The scales given on this drawing were prepared for A3 paper size as original.  
4. Do not scale from this drawing if the drawing is not printed on A3 paper size.

**ISSUED FOR INFORMATION**

Revision No:	
Drawing No:	CE-177/NE/MC/2024/10
Scale:	As Shown
Date:	October, 2024

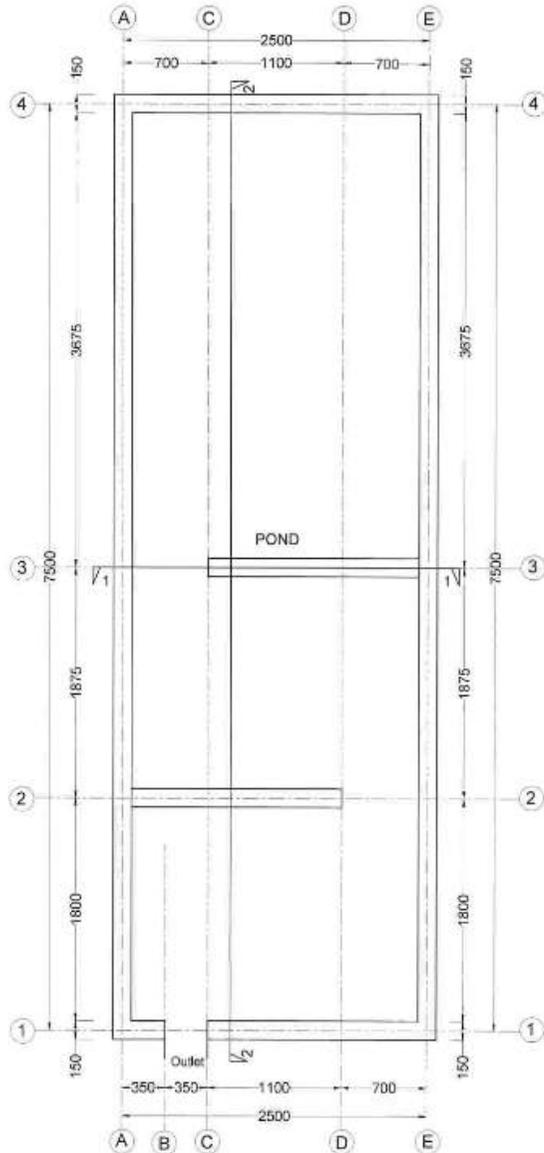
**CLIENT:**  
National Environmental Management Council  
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Tel: +255 754 365 968  
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**CONSULTANT:**  
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P.O. Box 71341  
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Tel: +255 222 618 375  
Mob: +255 754 626 390  
Email: info@olyengineering.co.tz  
**Location:**  
Mwacheshi Light Industrial Area, Coca Cola Road Plot 80, A.S. Mwambe Building, 6<sup>th</sup> Floor

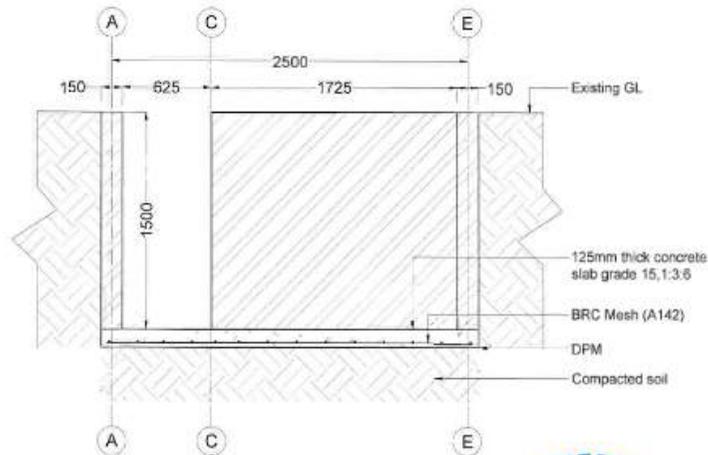
**COPYRIGHT HELD BY CECL:**  
THIS DRAWING MUST NOT BE COPIED, SHARED WITH THIRD PARTIES, OR USED DIRECTLY OR INDIRECTLY FOR ANY PURPOSE OTHER THAN THOSE EXPRESSLY SPECIFIED

- DISCIPLINE:**
- Environmental
  - Water Resources
  - Civil
  - Structural
  - Mechanical
  - Mineral Processing
  - Architectural
  - Others

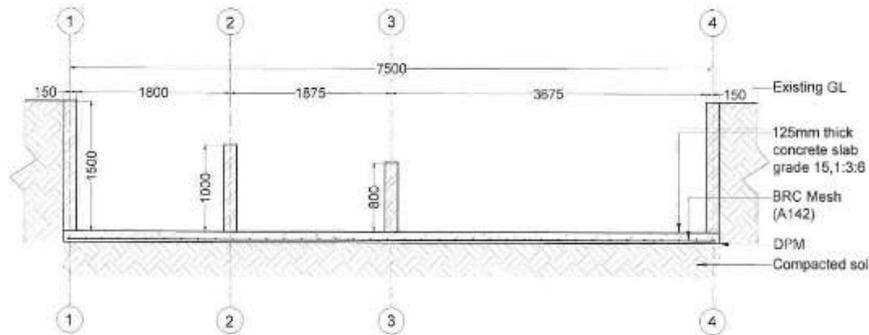
Designed by:	CECL Team
Drawn by:	Rifat Said
Checked by:	Joseph Damian
Approved by:	Oscar P. May
Authorised by:	Elsa Kweku



SETTLING POND 1 PLAN; SCALE 1:35



SECTION 1-1; SCALE 1:30



SECTION 2-2; SCALE 1:50



PROJECT TITLE:  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Masawa, Gella, Singida, Mbeya and Shinyanga

DRAWING TITLE:  
Settling Pond 1 Details

- NOTES:
1. All dimensions are in millimeters unless otherwise stated
  2. All levels are in meters above mean sea level
  3. The scales given on this drawing were prepared for A3 paper size as original.
  4. Do not scale from this drawing if the drawing is not printed on A3 paper size.

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INFORMATION

Revision No:	
Drawing No:	CE-177/NEMCO2024/11
Scale:	As Shown
Date:	October, 2024

CLIENT:  
National Environmental Management Council  
P.O. Box 63154  
Dar Es Salaam, Tanzania  
Tel: +255 715 265 198  
Tel: +255 754 366 988  
Email: [dg@nemo.or.tz](mailto:dg@nemo.or.tz)

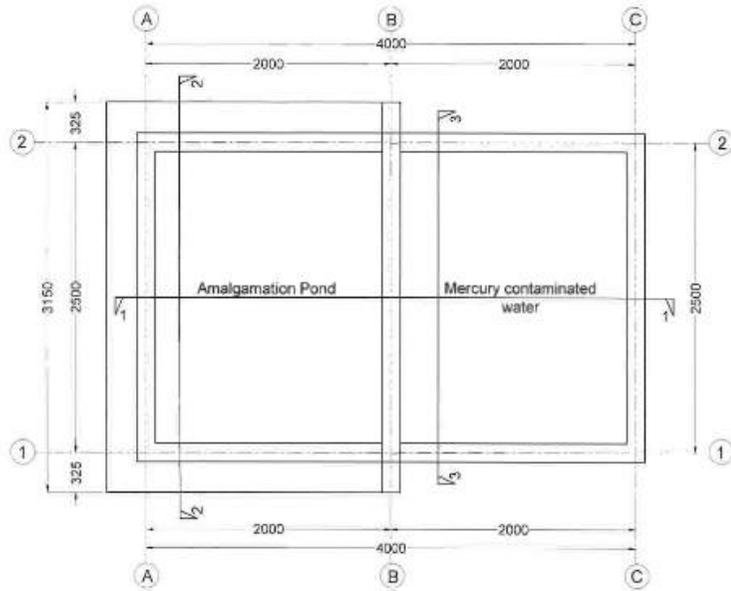
CONSULTANT:  
P.O. Box 71341  
Dar Es Salaam  
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Mob: +255 754 620 350  
Email:  
[info@cityengineering.co.tz](mailto:info@cityengineering.co.tz)

Location:  
Mikocheni Light Industrial Area, Coca Cola Road Plot 80, A.S Masamba Building, 6<sup>th</sup> Floor

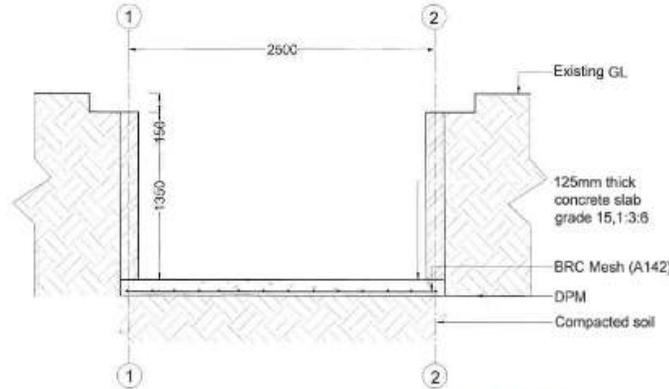
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- Environmental
  - Water Resources
  - Civil
  - Structural
  - Mechanical
  - Mineral Processing
  - Architectural
  - Others

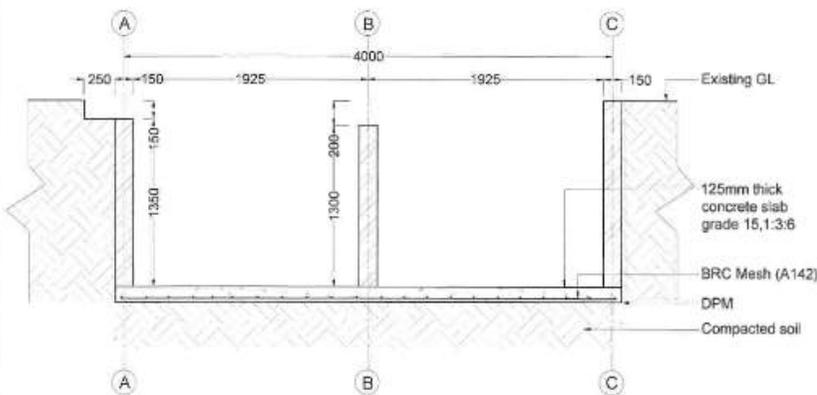
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Drawn by:	Rifat Said
Checked by:	Joseph Daman
Approved by:	Oscar P May
Authorised by:	Elika Kiwilo



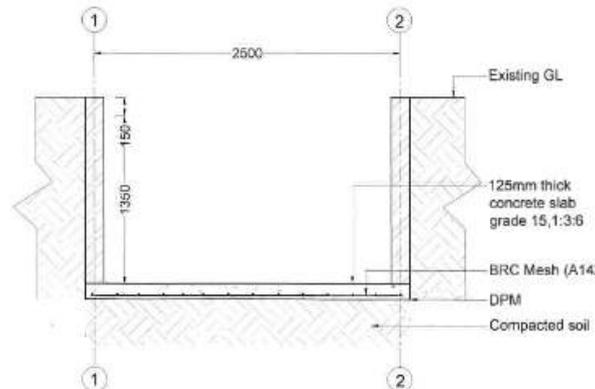
AMALGAMATION POND PLAN; SCALE 1:35



SECTION 2-2; SCALE 1:35



SECTION 1-1; SCALE 1:35



SECTION 3-3; SCALE 1:35



PROJECT TITLE:  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Mwanza, Geita, Singida, Mbeya and Shinyanga

DRAWING TITLE:  
Amalgamation Pond Details

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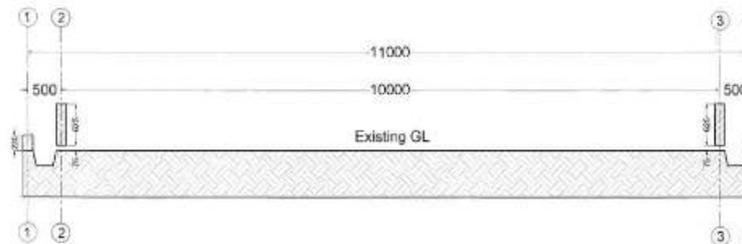
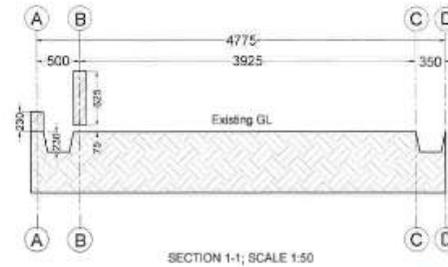
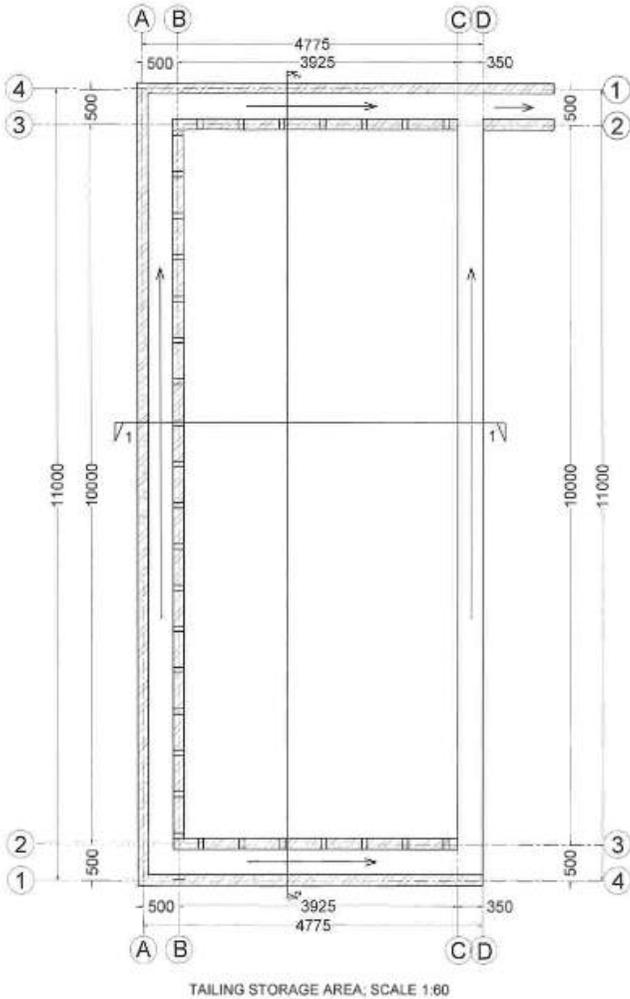
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Designed by:	CECL Team
Drawn by:	Rifal Said
Checked by:	Joseph Damian
Approved by:	Cesar P. Mlay
Authorised by:	Elna Kiwili



**PROJECT TITLE:**  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Mwarusa, Geta, Singito, Mbeya and Shinyanga

**DRAWING TITLE:**  
Tailing Storage Area Details

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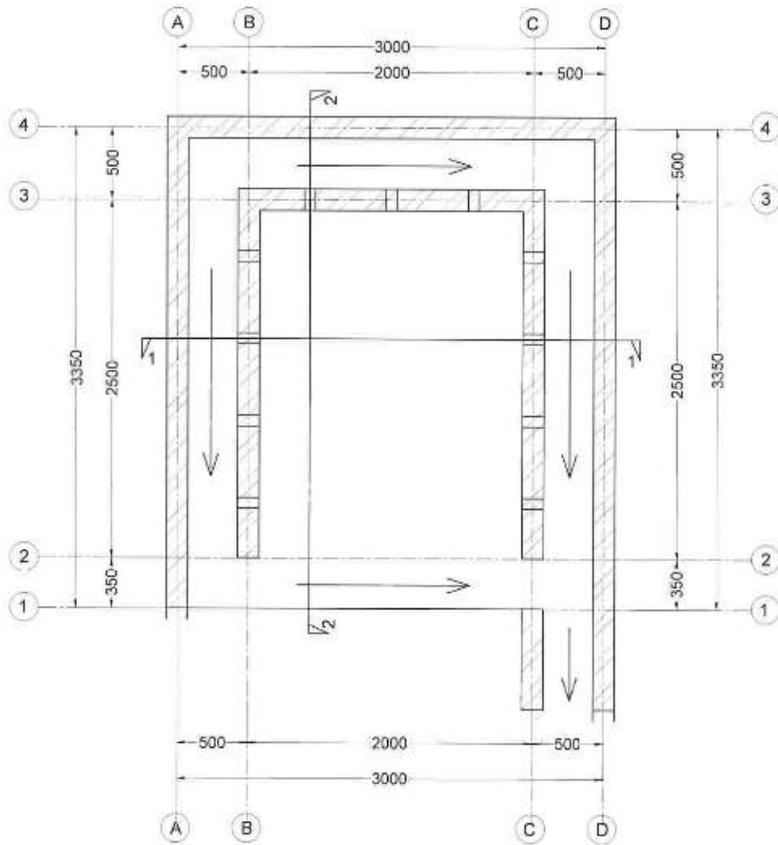
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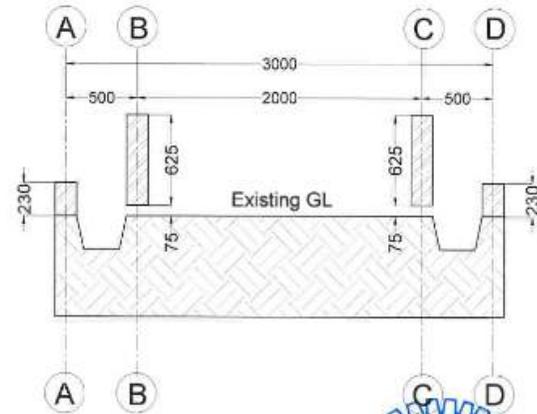
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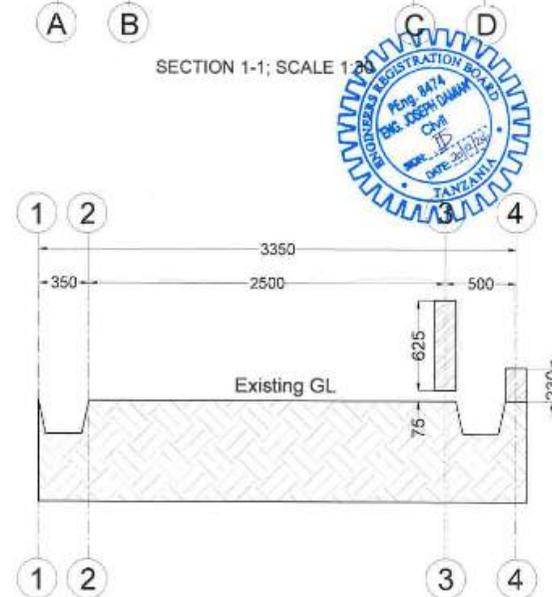
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Approved by:	Oscar P Mlay
Authorised by:	Elisa Kivuli



MERCURY CONTAMINATED TAILING AREA; SCALE 1:30



SECTION 1-1; SCALE 1:30



SECTION 2-2; SCALE 1:30



PROJECT TITLE:  
Design and Construction Supervision of Gold Ore Processing and  
Washing Facilities for ASGM in Mwanza, Geta, Singita, Mbeya  
and Shinyanga

DRAWING TITLE:  
Mercury Contaminated Tailing Area

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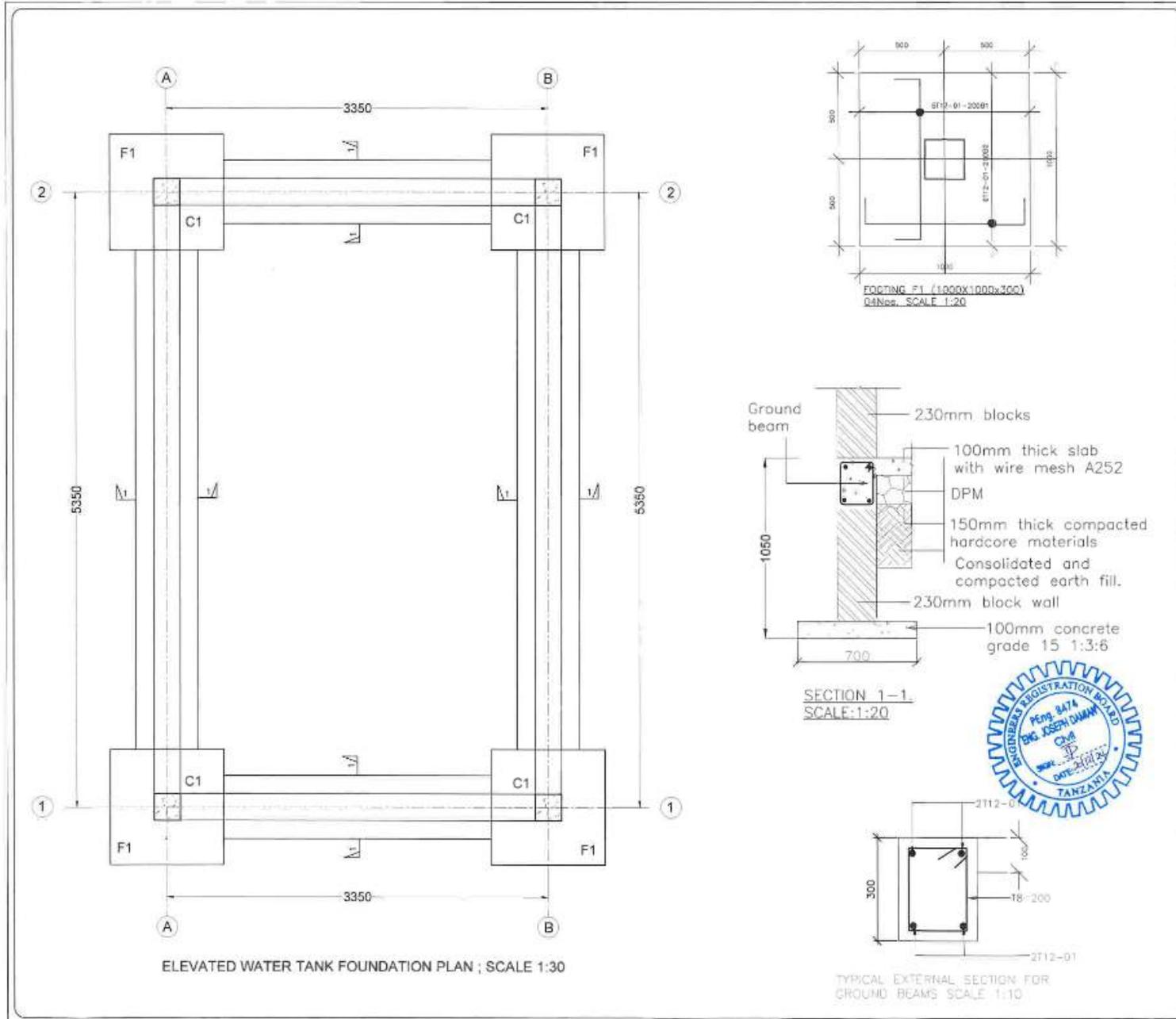
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Designed by:	CECL Team
Drawn by:	Rifkat Said
Checked by:	Joseph Damian
Approved by:	Oscar P Miley
Authorized by:	Elika Kileku



**PROJECT TITLE:**  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Marua, Gola, Singida, Mueya and Shinyanga

**DRAWING TITLE:**  
Elevated Water Tank Foundation Details

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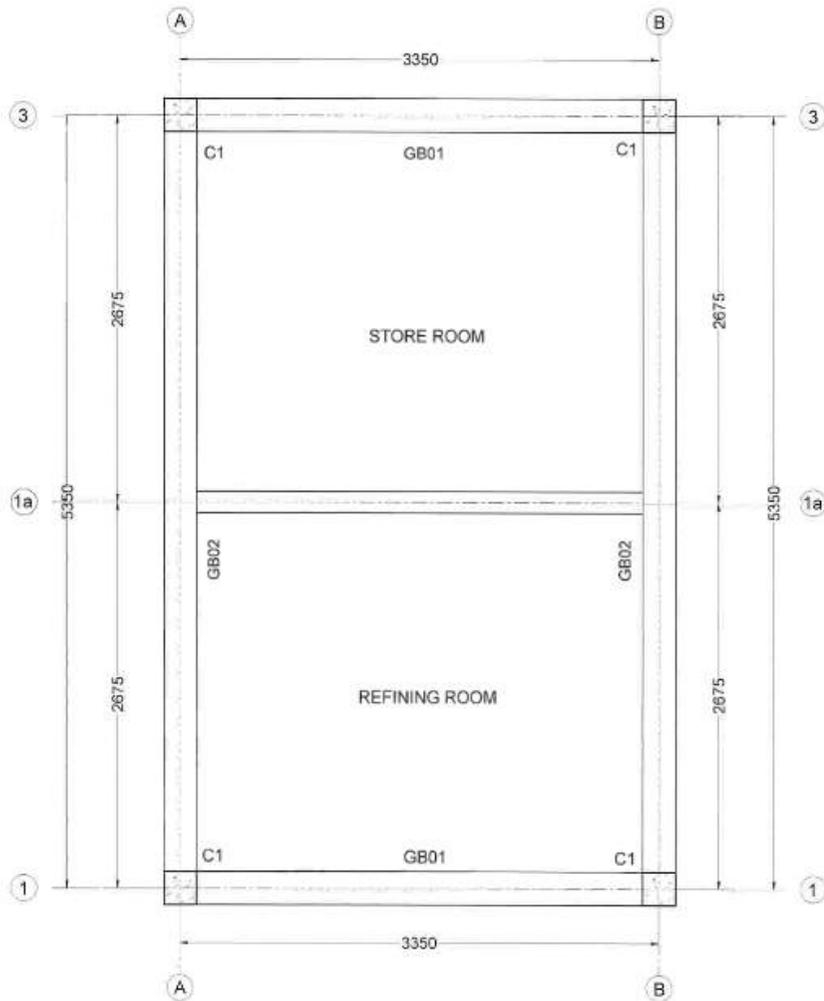
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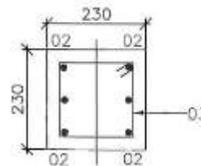
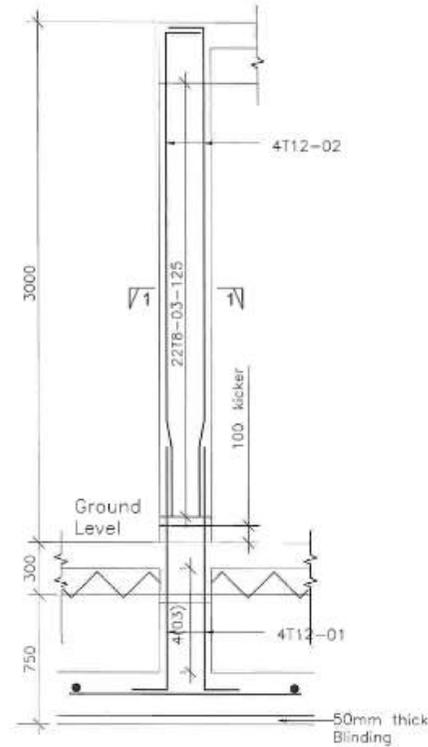
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Checked by:	Joseph Damian
Approved by:	Oscar P. May
Authorized by:	Elsa Kiwili



ELEVATED WATER TANK LAYOUT PLAN ; SCALE 1:30



SECTION 1-1  
SCALE 1:10



PROJECT TITLE:  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASCM in Mwarusa, Gella, Singda, Mbeya and Shinyanga

DRAWING TITLE:  
Elevated Water Tank Layout Plan and Column Details

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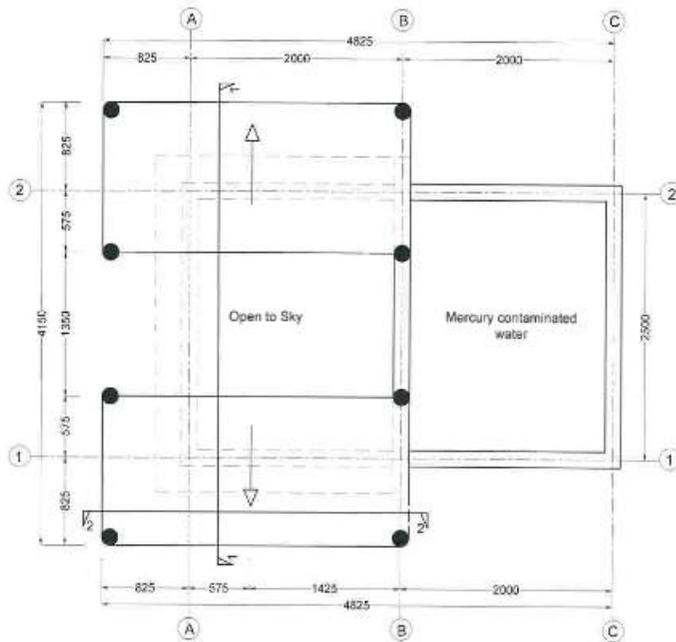
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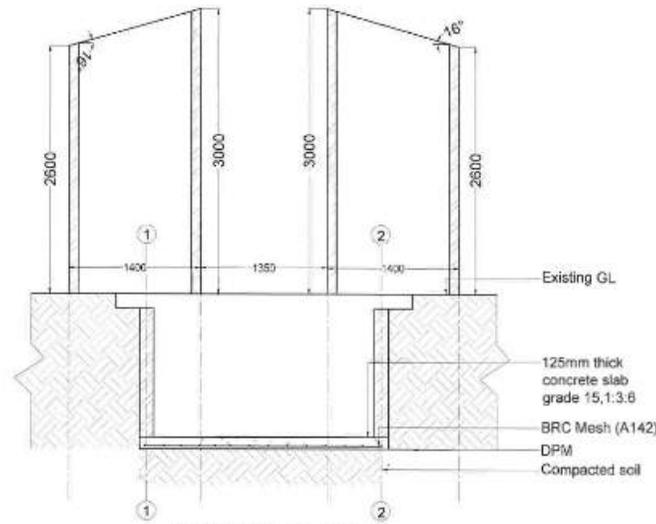
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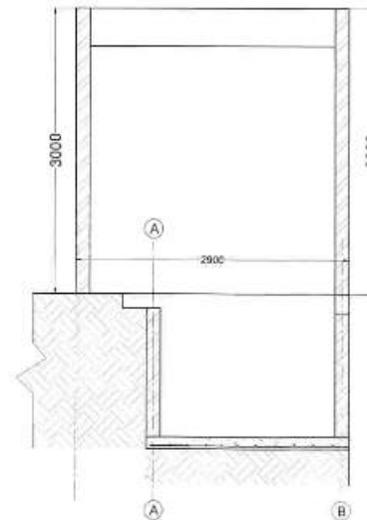
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Checked by:	Joseph Damini
Approved by:	Cesar P Mley
Authorised by:	Elika Kiwelu



AMALGAMATION POND SHADING PLAN, SCALE 1:35



SECTION 1-1; SCALE 1:45



SECTION 2-2; SCALE 1:45



PROJECT TITLE:  
Design and Construction Supervision of Gold Ore Processing and  
Washing Facilities for ABGM in Mwanza, Gola, Singida, Mbeya  
and Shinyanga

DRAWING TITLE:  
Amalgamation Pond Shading Details

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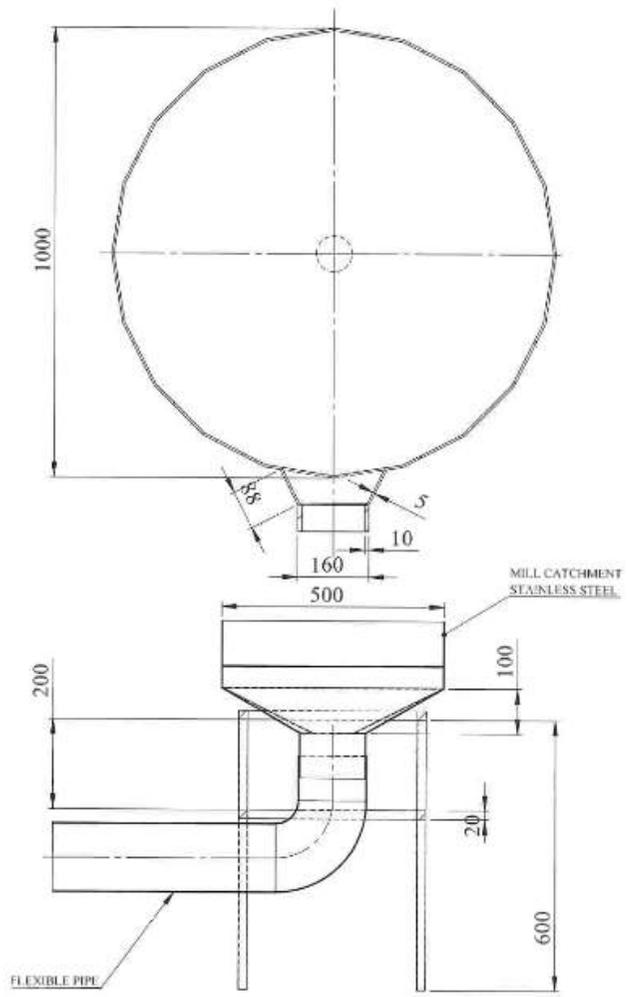
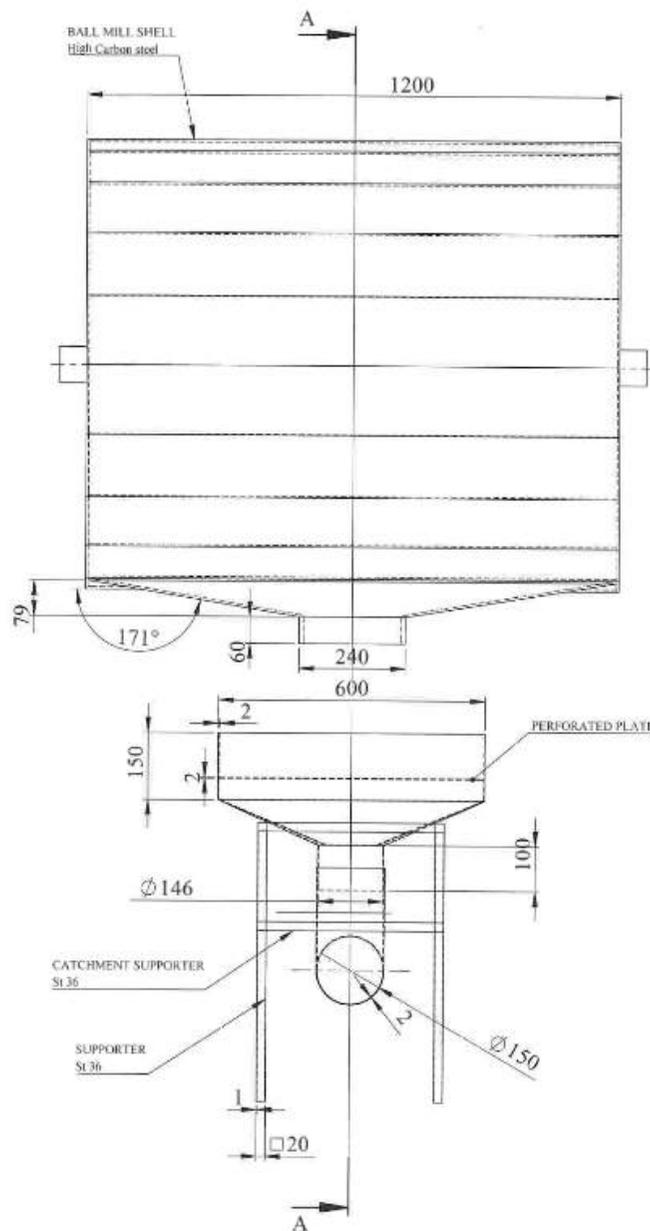
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Checked by:	Joseph Danian
Approved by:	Oscar P. May
Authorised by:	Elika Kiwisi



SECTION A-A



**PROJECT TITLE**  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Mwanza, Geita, Singida, Mbeya, and Shinyanga Regions

**DRAWING TITLE**  
Ball Mill

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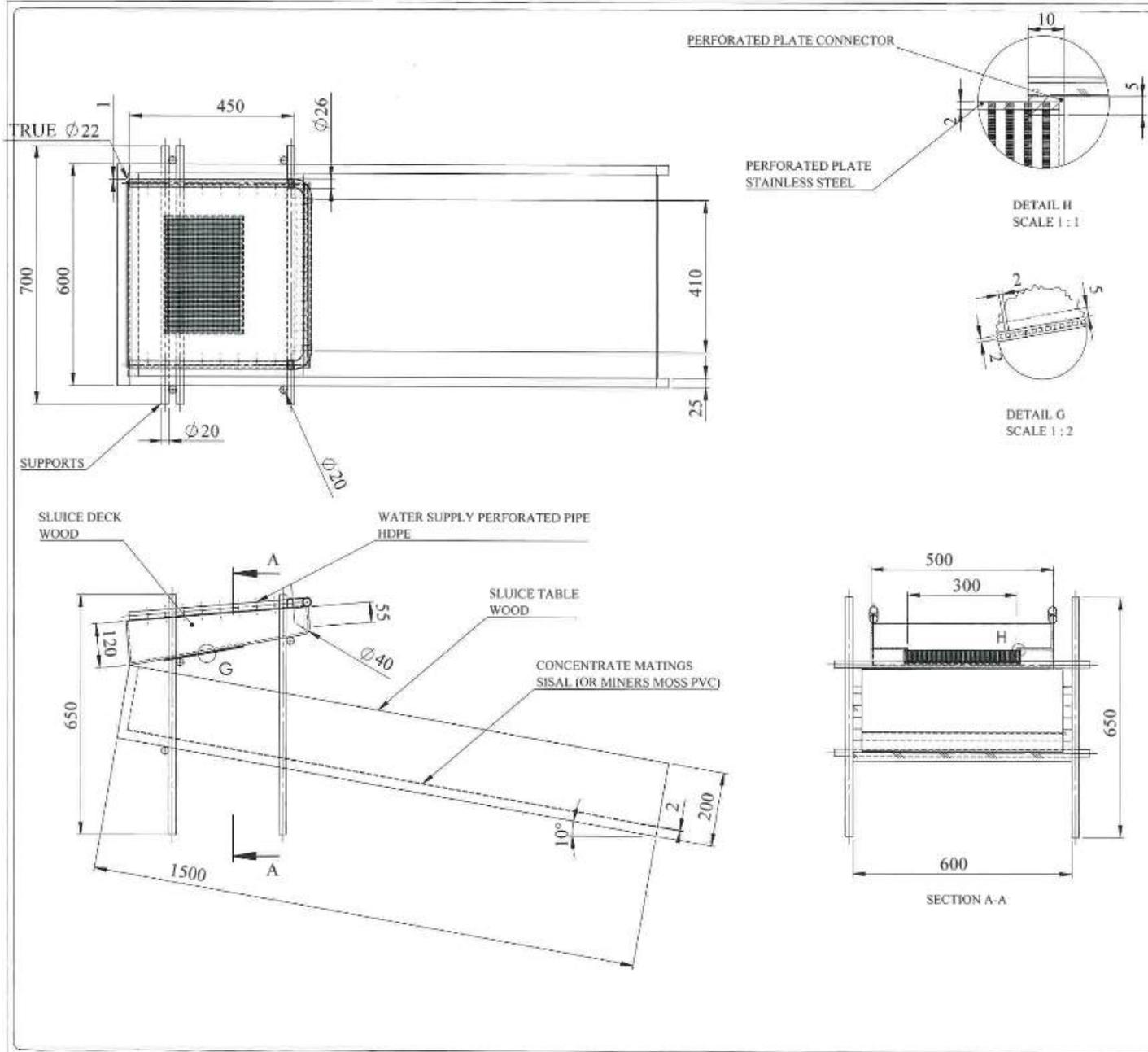
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Designed by:	Sarah Mhoya
Drawn by:	Abubakeri Uliya
Checked by:	Joseph Damian
Approved by:	Oscar Mlay
Authorised by:	Elika Kiwelu



**PROJECT TITLE**  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Mwanza, Geita, Sirigoda, Mheya, and Shinyanga Regions

**DRAWING TITLE**  
Sluice table detail design

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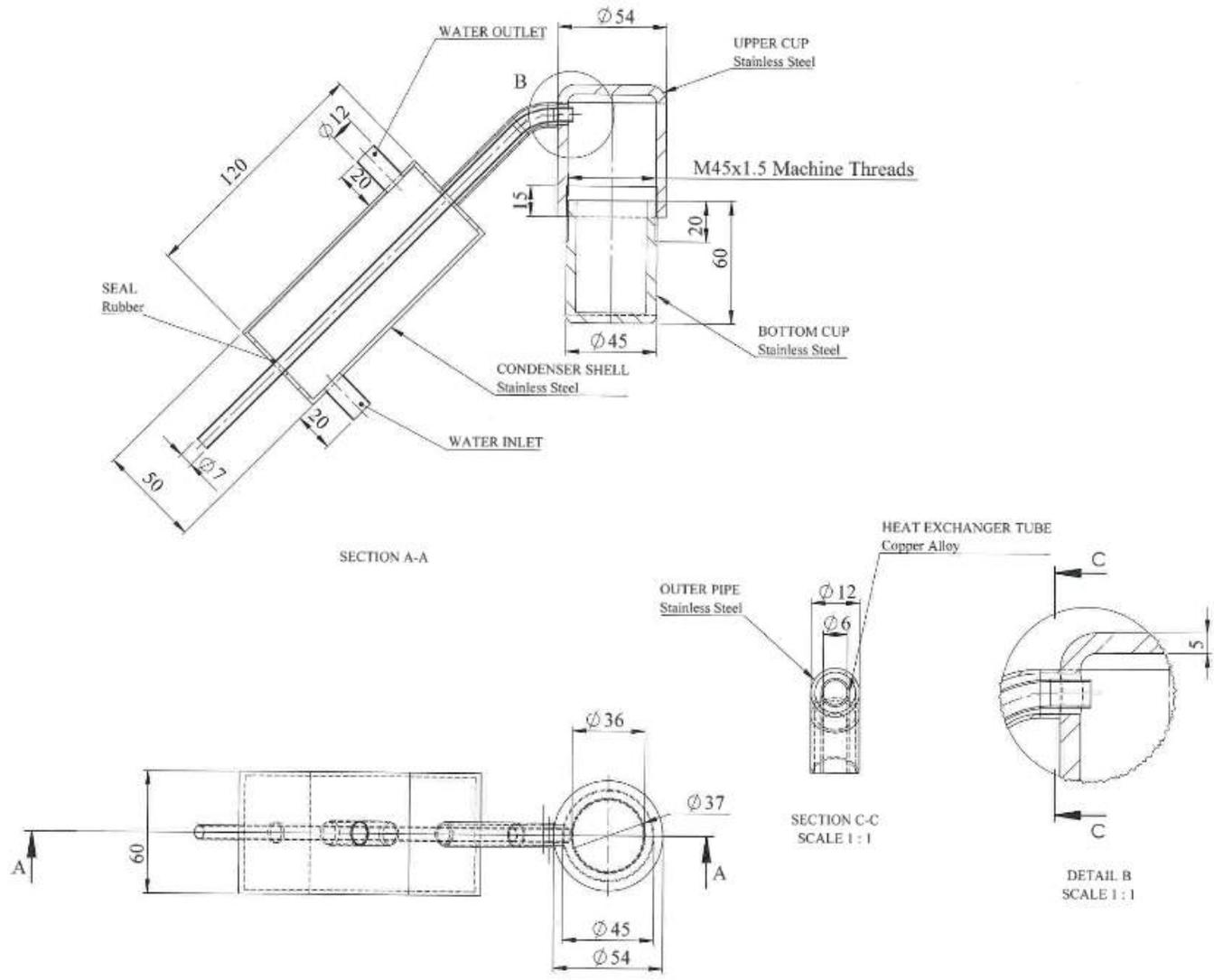
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- Architectural
- Other

Designed by:	Lightness Mamuya
Drawn by:	Abubakari Ulaya
Checked by:	Joseph Damian
Approved by:	Oscar Mlay
Authorised by:	Elsa Kiwelu



**PROJECT TITLE**  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Mwanza, Geita, Singida, Mbeya, and Shinyanga Regions

**DRAWING TITLE**  
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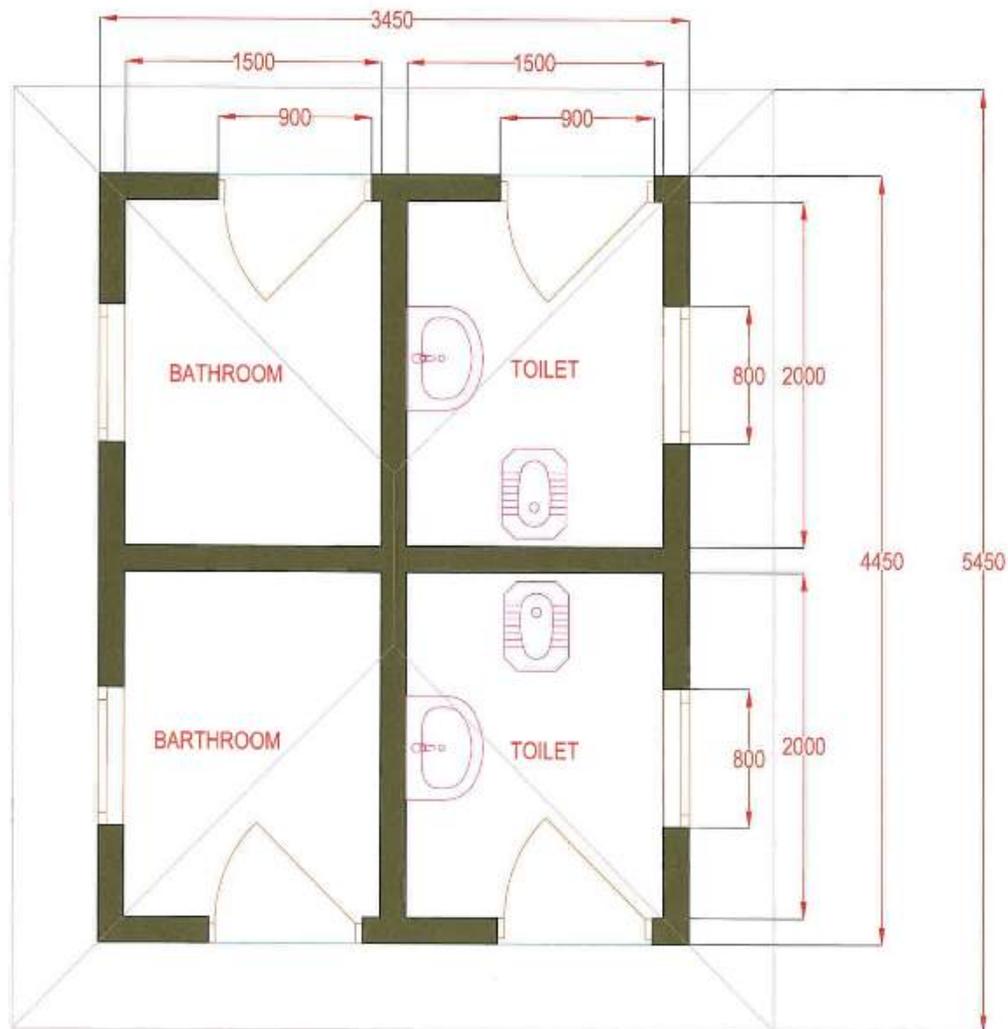
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Checked by:	Joseph Damian
Approved by:	Oscar Mlay
Authorised by:	Elina Kiwelu





**PLAN VIEW**



**PROJECT TITLE:**  
Design and Construction Supervision of Gold Ore Processing and Washing Facilities for ASGM in Mwanza, Gota, Shingira, Mbeya and Shinyanga

**DRAWING TITLE:**  
TOILETS PLAN

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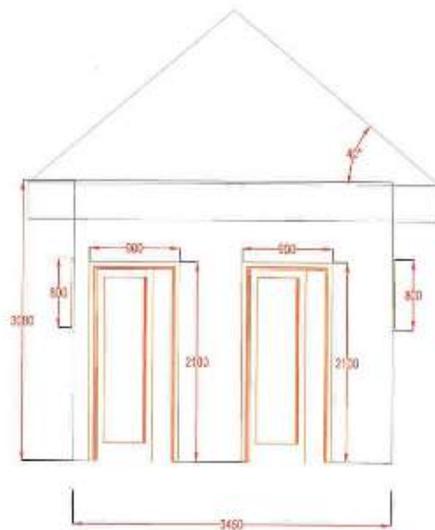
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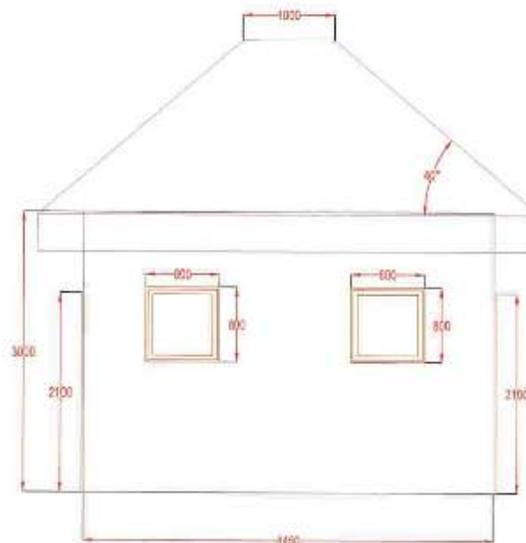
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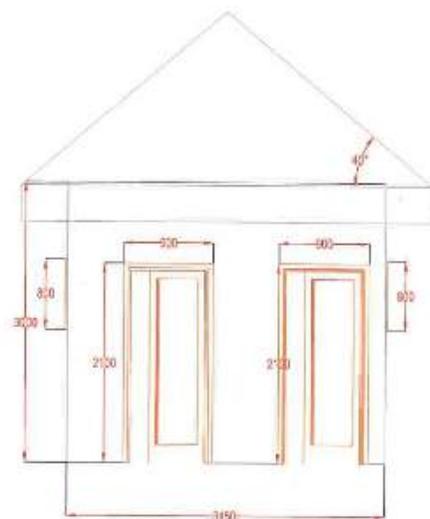
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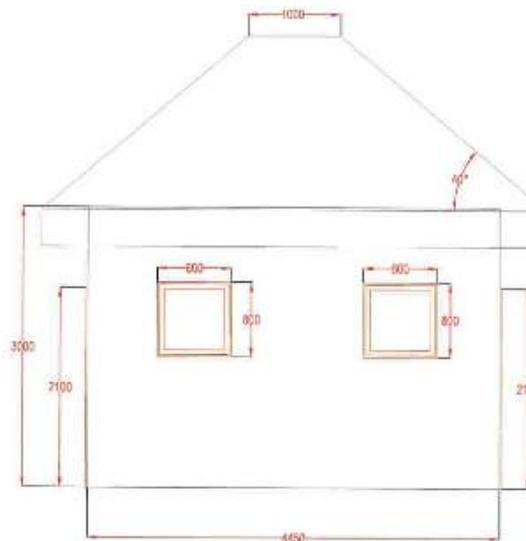
NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION



**PROJECT TITLE:**  
Design and Construction Supervision of Gold Ore Processing and  
Washing Facilities for ASGM in Mwanza, Geita, Shigda, Mbeya  
and Shinyanga

**DRAWING TITLE:**  
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