

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF GOLD ORES PROCESSING AND WASHING FACILITIES LOCATED AT NKONKILANGI VILLAGE, NTWIKE WARD, IRAMBA DISTRICT IN SINGIDA REGION

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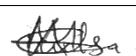
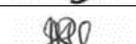
DECLARATION

I declare the following:

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

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ABBREVIATIONS AND ACRONYMS

AFWIMM	Africa Forum on Women in Mining and Minerals
AIDS	Acquire Immune Deficiency Syndrome
ARI	Acute Respiratory Infections
As	Arsenic
ASGM	Artisanal and Small-scale Gold Miners
ASM	Artisanal and Small-scale Miners
Ca	Calcium
CBOs	Community-Based Organizations
Cd	Cadmium
CECL	City Engineering Company Limited
Cl	Chlorine
Cr	Chromium
CRDB	Cooperative Rural Development Bank
Cu	Copper
dBA	decibels
DC	District Council
DED	District Executive Directors
DEM	Digital Elevation Model
DEMO	District Environment Management Officer
DMO	District Medical Officer
E&S	Environmental and Social
EA	Environmental Audit
EHPMP	Environmental Health and Pollution Management Project
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environment Management Act
EPP	Environmental Protection Plan
ESCBA	Environmental and Social Cost Benefit Analysis
ESCP	Environmental and Social Commitment Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
FDI	Foreign Direct Investment
Fe	Iron
FGD	Focus Group Discussions
GBV	Gender-Based Violence
GCLA	Government Chemist Laboratory Authority
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GIS	Geographic Information System
GOP	Gold Ores Project

GoT	Government of Tanzania
GPS	Global Position System
GRM	Grievance Redress Mechanism
Hg	Mercury
HIV	Human Immunodeficiency Virus
HSE	Health and Safety Expert
ICGLR	International Conference of the Great Lakes Region
IDB	Internal Drainage Basin
IIED	International Institute for Environment and Development
K	Potassium
LC	Least Concern
LGAs	Local Government Authorities
LMP	Labour Management Plan
LSM	Large-Scale Mining
MC	Municipal Council
Mg	Magnesium
MOI	Medical Officer In charge
MRO	Mines Resident Officer
Na	Sodium
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGOs	Non-Governmental Organizations
Ni	Nickel
NMB	National Microfinance Bank
OECD	Organization for Economic Co-operation and Development
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Authority
Pb	Lead
PDF	Portable Document Format
PIT	Project Implementation Team
PML	Primary Mining License
PPE	Personal Protective Equipment
RAS	Regional Administrative Secretary
RC	Regional Commissioner
RE	Revised
REA	Rural Electrification Agency
RFO	Regional Fire Officer
RINR	Regional Initiative against the Illegal Exploitation of Natural Resources
RMO	Regional Medical Officer
RMO (Mines)	Resident Mines Officer
ROM	Run of Mine
RPC	Regional Police Commander
Sb	Antimony
SEA	Strategic Environmental Assessment

SEP	Stakeholder Engagement Plan
SO4	Sulphate
SWAT	Soil and Water Assessment Tool
TANESCO	Tanzania Electric Supply Company Limited
TAWOMA	Tanzania Women Miners Association
TFS	Tanzania Forest Service Agency
ToR	Term of Reference
TTCL	Tanzania Telecommunication Company
TV	Television
UN	United Nation
URT	United Republic of Tanzania
UTI	Urinary Tract Infections
VAC	Violence Against Children
VC	Village Councils
VEO	Village Executive Officers
VPO	Vice President Office
WB	World Bank
WCDO	Ward Council Development Officer
WDC	Ward Development Committee
WEO	Ward Executive Officer
Zn	Zinc
°C	degrees Celsius
cm	Centimetre
dB	A-weighted decibel
g	gram
kg	Kilogram
km	Kilometre
Km²	Kilometre square
m	meter
mg/L	Milligram per Liter
mg/Nm³	Milligrams per cubic meter
mm	Millimetre
mm/s	Millimetres per second

EXECUTIVE SUMMARY

INTRODUCTION

The proposed project will be constructed at Sekenke One Mining Co. Society Ltd site, where mining activities have been ongoing since 2016. The mineral right of the area is owned by Sekenke One Mining Co. Society Ltd with a Primary Mining License PML006315CZ. Mining is primarily conducted underground, with a total of 30 mining pits (Maduara), which 22 are active and 8 are temporarily closed. These operations are carried out by Artisanal and Small-scale Gold Mining (ASGM) methods, which involve the use of mercury for gold processing. To address the health risks associated with mercury use in ASGM, the Tanzania Environmental Health and Pollution Management Project (EHPMP) has been initiated. Its goal is to enhance institutional capacity for managing and regulating mercury use while introducing alternative technologies for gold recovery.

The National Environmental Management Council (NEMC), along with the Mining Commission, acting as the Project Implementation Team (PIT), plans to construct Mercury mineral processing centers equipped with Personal Protective Equipment (PPE). These centers will serve as demonstration sites for safe mercury handling in ASGM areas, specifically in Nkonkilangi Village, Iramba District, Singida Region. The project is divided into several Lots, with Lot 1 focusing on proposed demonstrations of mineral centers in Shinyanga and Singida Regions.

LOCATION

The project is situated at Sekenke One Mining Co. Society Ltd Site, at coordinates (04°15'49.7' S, 34°09'57.8''E) It is located administratively in Nkonkilangi Village, Ntwike Ward in Iramba district, Singida Region. To reach the site, approximately a 100 km drive north from Singida Town on the Dar to Mwanza tarmac highway, branching off at Shelui Centre and then driving about 14 km on an all-weather gravel road to Nkonkilangi village center, where the site is located.

PROJECT DESCRIPTION

The proposed project involves designing and constructing Mercury mineral processing centers equipped with Personal Protective Equipment (PPE) to be used as demonstration centers for the safe handling of Mercury during gold processing in Artisanal and Small-scale Gold Mining (ASGM) and enable subsector that can be adopted and accepted by the ASG miners, service providers, Local communities surrounding the mining sites and Regulators. This project is funded by the Global Environmental Facility (GEF) through a Grant Aid Agreement signed by the Government of Tanzania (GoT) and the World Bank (WB), and it will operate to meet WB and Tanzania legal requirements.

The proposed project will involve several activities such as site preparation, and site investigations including comprehensive environmental baseline studies, and construction activity which involves the implementation of foundation such as sluices, VAT leaching tanks, drainage, and amalgamation pools, vital for ore processing, more effort will be focused on the rehabilitation of degraded land through strategic landscaping and tree-planting initiatives, promoting ecological balance. Logistics management becomes paramount, facilitating the continuous transit of supplies and personnel to and from the site, optimizing productivity. During its operation, the project will involve activities such as ore drying to reduce moisture content and improve processing efficiency, ore crushing by use of hand grinding, and milling operations carried out using crushers, sluicing techniques are used to separate gold particles from other minerals and impurities, the amalgamation process combines gold particles with mercury to form a gold amalgam and purification process to remove mercury and impurities through controlled heating, ensuring high-quality gold refinement. Throughout these operations, adherence to industry standards and safety protocols is essential, and continuous monitoring and quality control measures are implemented to ensure product integrity and environmental compliance.

On decommissioning phase of the project rehabilitation or enhancement of project structures and the restoration of the project site to its original state will be done in accordance with the decommissioning plan.

LEGAL REQUIREMENTS

Several policies and legislations set out the legal and regulatory requirements that are relevant to the proposed project. Additionally, there are pertinent standards governing environmental management and protection, health, and safety. Relevant policies and legislations about the development of the project, mainly environmental management, were examined to ensure that the proposed development project meets and abides by these regulations.

The proposed project is subject to various policies, legislations, standards, regulations, and guidelines to ensure legal and regulatory compliance.

Category	List of Relevant Legal Framework
Policy	<ul style="list-style-type: none"> ● The National Environmental Policy (2021) ● National Mineral Policy (2009) ● National Health Policy (URT, 2003) ● Construction Industry Policy (2003) ● National Land Policy (1997) ● National Gender Policy (2002), Energy Policy (2015) ● National Water Policy (URT, 2002) ● National Mineral Policy (2009)
Acts	<ul style="list-style-type: none"> ● Environmental Management Act 2004

Category	List of Relevant Legal Framework
	<ul style="list-style-type: none"> ● Mining Act (CAP 123 R.E 2019). ● The Explosives Act of 1963 ● The Water Resources Management Act, 2009 ● The Occupational Safety and Health Act 2015 ● The Employment and Labor Relations Act 2009 ● The Tanzania Extractive Industries (Transparency and Accountability) Act No. 21 of 2015
Regulations	<ul style="list-style-type: none"> ● Water Resources Management (Dam Safety) Regulation, 2013 ● Environmental Impact Assessment and Audit (Amendment) Regulations (2018), Environmental Management (Air Quality Standards) Regulations, 2007 ● Environmental Management (Soil Quality Standards) Regulations, 2007, ● Environmental Management (Water Quality Standards) Regulations, 2007 ● Mining (Environmental Protection for Small Scale Mining) Regulations, 2010 ● Mining (safety, Occupational Health and Environmental Protection) Regulations, 2010 are not mentioned

The institutions involved in this project are the Vice President's Office (Division of Environment), the National Environment Management Council (NEMC), the Ministry of Minerals, Local Government and Regional Administration, the Occupational Safety and Health Authority, Basin Water Boards, Government Chemist Laboratory Authority (GCLA) and NGOs and Miners Associations

ENVIRONMENTAL AND SOCIAL BASELINE

The biological environment study conducted encompasses the assessment of wildlife and vegetation present in the study area and its surroundings. This study was carried out using onsite surveys, interviews with locals, Focus Group Discussions, Opportunistic Sampling, and document reviews. Data from secondary sources indicates that about 70% of the Iramba district is covered by forests, woodland, thickets, and grassland. In Nkonkilangi village, common alien plants such as *Senna siamea* (known locally as Mjohoro) and *Mangifera indica* (Mango Tree) are found. Additionally, a few fauna species, including the Vervet monkey and olive baboon, were opportunistically observed and reported on the project site.

The average minimum temperature in Iramba ranges from 13°C to 29°C. The region experiences one high maximum rainfall, with the rainy season lasting from October to May and the dry season from June to September, with little to no precipitation. Singida's evaporation rate exceeds precipitation, particularly during the dry season when there is no rainfall, resulting in high evaporation rates.

The baseline study also assessed hydrology, surface water resources, and groundwater resources to determine water quality, quantity, and groundwater flow.

In terms of socio-economic aspects, the baseline study covers Iramba district and the local area (Ntwike ward). The main socio-economic activities in the area include agriculture, livestock keeping, mining, and small businesses.

STAKEHOLDER ENGAGEMENT

The stakeholders who were consulted are the Regional Commissioner, Iramba District commissioner, Iramba District Executive Director and Heads of departments, Government Chemist Laboratory Agency (GCLA), TFS, and Inland Drainage Basin Water Office Ntwike Ward Office, Nkonkilangi Village, and Mining area,

Among the key issues raised are

- To consider expanding the project's coverage and target a larger number of small miners
- The design and structure layout should be shared with the Fire officer for advice before they start the construction
- Providing education to the ASGM and the community about safety
- To collaborate with the regional fire department to provide additional education to address workplace emergencies and adhere to safety regulations

Some of the issues raised will be taken care of during the ESMP and Monitoring development.

IMPACT IDENTIFICATION, MITIGATION, AND EMP

The potential impacts identified are based on project activities, stakeholder consultation, and different studies conducted in this ESIA study. Among the impacts identified are:

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

The mitigation measures proposed to reduce or solve the above impacts in the ESMP responsible for providing resources to ensure all impacts are managed to compliance. There will be an HSE Manager who will oversee the implementation and compliance of the ESMP. The estimated cost will be available to implement the ESMP. Impacts will be managed according to project phases which are mobilization phase, construction phase, operational phase and decommissioning.

ENVIRONMENTAL MONITORING PLAN

Monitoring is done to check the performance of the mitigation measures on adverse impacts as a result of project activities. Water, air, vibration, sounds, and rehabilitation will be monitored. Sampling points will be classified as ambient/background, operational and

downstream (compliance points). Sampling of water, dust and vibrations will be done quarterly. Rehabilitation progress is taken over time with available mined disturbed areas such as pits areas.

COST-BENEFIT ANALYSIS

By comparing the tangible and intangible costs of the project which have inbuilt recovery/mitigation measures with the benefits of the project, it is clear that the project will be more beneficial than costly to the local communities, local environment and the nation at large.

DECOMMISSIONING

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

TABLE OF CONTENTS

Contents

DECLARATION	2
ACKNOWLEDGEMENT	3
ABBREVIATIONS AND ACRONYMS	4
EXECUTIVE SUMMARY	7
TABLE OF CONTENTS	12
LIST OF TABLES	19
LIST OF FIGURES.....	20
1 CHAPTER ONE: INTRODUCTION	1
1.1 BACKGROUND	1
1.2 PROJECT RATIONALE	1
1.3 ESIA OBJECTIVES	2
1.4 METHODOLOGY	3
1.4.1 Document Review	4
1.4.2 Field Visits	4
1.4.3 Stakeholder Analysis and Consultation	4
1.4.4 Field Surveys.....	5
1.4.5 Impact Identification and Assessment.....	5
1.4.6 Mitigation, ESMP, and Monitoring.....	5
1.5 SCOPE OF THE PROJECT	6
1.5.1 Spatial Boundaries	6
1.5.2 Temporal Boundaries.....	6
1.5.3 Institutional Boundaries.....	6
1.6 SCOPING TERMS OF REFERENCE	7
1.7 PRELIMINARY STUDIES	7
1.8 STRUCTURE OF THE REPORT	7
2 CHAPTER TWO: PROJECT DESCRIPTION	10

2.1	PROJECT LOCATION AND ACCESSIBILITY	10
2.2	LAND OWNERSHIP AND LAND USE	10
2.2.1	Site Selection	11
2.2.2	Declaration of the Project Area	12
2.2.3	Current Gold Processing Operations	12
2.3	PROPOSED GOLD ORES PROCESSING COMPONENTS	14
2.4	PROJECT PHASE AND ACTIVITIES	15
2.4.1	Pre-construction phase	16
2.4.2	Mobilization phase.....	16
2.4.3	Construction phase	16
2.4.4	Operational phase	16
2.4.5	Decommissioning Phase	17
2.5	PROJECT UTILITIES	17
2.5.1	Human Resources	17
2.5.2	Water Sources	18
2.5.3	Power Sources	18
2.6	WASTE MANAGEMENT	18
2.6.1	Non-Hazardous Wastes	18
2.6.2	Hazardous wastes	19
3	CHAPTER THREE: ADMINISTRATIVE INSTITUTIONAL AND LEGAL FRAMEWORK	20
3.1	INTRODUCTION	20
3.2	ADMINISTRATIVE INSTITUTIONAL FRAMEWORK FOR THE MANAGEMENT OF THE ENVIRONMENT	20
3.2.1	Environment Management Administration Framework	21
3.2.2	Administration at the ASGM Sites.....	24
3.3	PROJECT LEGAL FRAMEWORK	24
3.3.1	Relevant Policies	25
3.4	LEGAL FRAMEWORK	28

3.5	LEGISLATION.....	29
3.6	RELEVANT REGIONAL AND INTERNATIONAL LEGAL FRAMEWORK	36
	3.6.2 General EHS Guidelines	36
	3.6.3 EHS Guidelines for Mining	37
	3.6.4 EHS Guidelines for Construction	37
	3.6.5 World Bank Environmental and Social Standards (ESS) 2018	38
4	CHAPTER FOUR: BASELINE DATA	40
	4.1 GENERAL OVERVIEW AND APPROACH.....	40
	4.2 PHYSICAL ENVIRONMENT	40
	4.2.1 Climate.....	40
	4.2.2 Temperature	41
	4.2.3 Rainfall.....	41
	4.2.4 Evaporation	42
	4.2.5 Topography	43
	4.3 Geology And Soils	43
	4.4 Seismicity	44
	4.5 BIOLOGICAL ENVIRONMENT	45
	4.5.1 Flora And Fauna.....	45
	4.5.2 Flora	45
	4.5.3 Fauna	46
	4.6 WATER RESOURCES	46
	4.6.1 Hydrology and Surface Water Resources.....	47
	4.6.2 Groundwater	50
	4.6.3 Water Quality	50
	4.7 AIR QUALITY	52
	4.8 NOISE AND VIBRATION	54
	4.9 SOCIO-ECONOMIC BASELINE.....	55
	4.9.1 Geographic Location and Administration	55

4.9.2	Population.....	56
4.9.3	Water Supply	57
4.9.4	Health Facilities.....	58
4.9.5	Education and Literacy.....	58
4.9.6	Energy.....	59
4.9.7	Telecommunication.....	59
4.9.8	Infrastructure and Trasport System.....	60
4.9.9	Environment Conservation and Management.....	60
4.9.10	Waste Management and Sanitation	60
4.9.11	Housing and Ownership	61
4.9.12	Gender Issues, Social Relations, and Welfare of Children	61
4.9.13	Ethnicity and Cultural Heritage	61
4.9.14	Financial Services.....	61
4.9.15	Economic Activities	62
4.10	PROJECT AREA	62
4.10.1	Spatial boundaries.....	62
4.10.2	Legislative scope	62
4.10.3	Temporal Boundaries.....	63
4.10.4	Institutional Boundaries.....	63
5	CHAPTER FIVE: PUBLIC CONSULTATION AND INFORMATION DISCLOSURE	64
5.1	INTRODUCTION	64
5.2	OBJECTIVES OF STAKEHOLDER CONSULTATION.....	64
5.3	LEGISLATION REQUIREMENT.....	65
5.4	STAKEHOLDERS CONSULTATION PROCESS	65
5.4.1	Stakeholder Engagement Plan	65
5.4.2	Stakeholders Identification and Analysis	65
5.4.3	Methodology of Consultation	68
5.4.4	Stakeholders' Comments and Concerns	70

5.4.5	Reporting and Information Disclosure to Stakeholders	78
5.4.6	Grievance Mechanism	78
6	CHAPTER SIX: ASSESSMENT OF IMPACT AND IDENTIFICATION OF ALTERNATIVES	79
6.1	IDENTIFIED IMPACTS	79
6.1.1	Generation of Undesirable Levels of Noise to workers	79
6.1.2	Employee Health, Safety and Welfare	79
6.1.3	Community Health and Safety Risks	80
6.1.4	Impacts on Water Resources	82
6.1.5	Generation of Hazardous Waste	82
6.1.6	Air Quality Impacts	82
6.1.7	Impacts on Soil	83
6.2	IMPACT ASSESSMENT CRITERIA.....	83
6.3	ALTERNATIVES ANALYSIS	91
6.3.1	No Project Alternative	91
6.3.2	VAT leaching Directly after Milling	91
6.3.3	Direct Smelting	92
6.3.4	Use of retorts	92
6.3.5	Alternative Water Sources	93
6.3.6	Alternative Power Sources	94
7	CHAPTER SEVEN: IMPACTS MITIGATION MEASURES.....	95
7.1	MITIGATION MEASURES FOR IMPACTS DURING CONSTRUCTION	95
7.2	MITIGATION MEASURES FOR IMPACTS DURING OPERATIONS	101
7.3	MITIGATION MEASURES DURING THE DECOMMISSION PHASE	108
8	CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	113
9	CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MONITORING PLAN.....	127
9.1	ASPECTS OF ENVIRONMENTAL MONITORING SYSTEM	127
10	CHAPTER TEN: EMERGENCY PREPAREDNESS AND RESPONSE PLAN FOR NKONKILANGI IRAMBA.....	132

10.1	INTRODUCTION	132
10.2	SCOPE OF THE PLAN	132
10.3	OBJECTIVES	132
10.4	EMERGENCY RESPONSE ORGANIZATION	132
1.1.1	Emergency Response Team (ERT).....	132
10.5	EMERGENCY SCENARIOS AND RESPONSE PROCEDURES	133
1.1.2	Fire Outbreaks	133
1.1.3	Equipment and Resources.....	134
10.6	Pit Wall Collapse/Landslides	134
1.1.4	Potential Causes	134
1.1.5	Prevention Measures	135
1.1.6	Response Procedure	135
1.1.7	Equipment and Resources.....	135
10.7	Mercury Exposure and Poisoning	135
1.1.8	Potential Causes	135
1.1.9	Prevention Measures	136
10.8	Response Procedure	136
1.1.10	Equipment and Resources.....	137
10.9	Machinery and Equipment Accidents	137
1.1.11	Potential Causes	137
1.1.12	Prevention Measures	137
1.1.13	Response Procedure	137
1.1.14	Equipment and Resources.....	138
10.10	Medical Emergencies	138
1.1.15	Potential Scenarios	138
1.1.16	Prevention Measures	138
1.1.17	Response Procedure	138
1.1.18	Equipment and Resources.....	139

10.11	COMMUNICATION PLAN	139
1.1.19	Internal Communication	139
1.1.20	External Communication	140
1.1.21	Communication Equipment	140
10.12	TRAINING AND DRILLS	140
1.1.22	Training Programs.....	140
1.1.23	Emergency Drills	141
10.13	RESOURCE MANAGEMENT.....	141
1.1.24	Equipment Maintenance.....	141
1.1.25	8.2. Resource Accessibility	141
10.14	POST-EMERGENCY ACTIONS	141
1.1.26	Incident Assessment	142
1.1.27	Recovery and Restoration	142
1.1.28	Plan Review and Update.....	142
10.15	CONCLUSION.....	142
11	CHAPTER ELEVEN: COST AND BENEFIT ANALYSIS	143
11.1	INTRODUCTION	143
11.2	PROJECT COSTS	143
11.3	PROJECT BENEFITS.....	144
11.4	ANALYSIS.....	144
12	CHAPTER TWELVE: CONCEPTUAL DECOMMISSIONING PLAN	146
13	CHAPTER THIRTEEN: SUMMARY AND CONCLUSION	147

LIST OF TABLES

Table 3-1: Institutional Arrangement for Environmental Management	22
Table 3-2: Legislation that Governs the Project	29
Table 4-1: Students Enrolled in Primary Schools in Ntwike Ward for year 2023	49
Table 5-1: List of Project Stakeholders and their roles	57
Table 5-2: Record of the Stakeholders' Concerns and Responses	62
Table 6-1: Risk Assessment Criteria	70
Table 6-2: Construction Phase Impacts Identified and Their Corresponding Risk Level	71
Table 6-3: Operations Phase Impacts Identified and Their Corresponding Risk Level	73
Table 6-4 :Decommission Phase Impacts Identified and Their Corresponding Risk Level	75
Table 7-1: Mitigation Measures for the Construction Phase	80
Table 7-2: Mitigation Measures for Operation Impacts	85
Table 7-3: Mitigation measures	89
Table 8-1: Environmental and Social Management Plan	92
Table 9-1: Environmental Monitoring Plan	102
Table 10-1: Team Structure and Roles	104
Table 11-1: Benefits of Implementing the Project	115

LIST OF FIGURES

Figure 2-1: Project Accessibility	10
Figure 2-2: Proposed site	11
Figure 2-3: Current Gold Ores Processing at ASGM Sites	13
Figure 2-4: Proposed Gold Ore Processing Plant Layout	15
Figure 2-5: The main shaft to access the Sekenke Gold Mine built by the Germans back in the year 1909	17
Figure 3-1: Institutional Framework Structure	22
Figure 4-1: Temperature Patterns at Iramba District	37
Figure 4-2: Annual Rainfall Patterns at Iramba District	38
Figure 4-3: Evaporation Rates recorded in Iramba	38
Figure 4-4: Windrose diagram presenting wind speed and direction	39
Figure 4-5: Tanzania Seismicity Hazard Map	40
Figure 4-6: Acacia woodland at Sekenke One Mine (Left) and at Nkonkilangi Village (Right)	41
Figure 4-7: Internal Drainage Basin	42
Figure 4-8: Watershed containing Nkonkilangi Project Area	44
Figure 4-9: A significant Seasonal stream (Mwajuma) at Nkonkilangi village	45
Figure 4-10: Administrative Map	47
Figure 4-11: District Councils in Singida Region	48
Figure 4-12: 500KVA Generators available at some of the mining operators at Sekenke One	50
Figure 4-13: Plastic waste haphazardly disposed at Sekenke One Mining Area	51
Figure 5-1: A FGDs with ward development committee on Ntwike ward at Nkonkilangi village office	61

1 CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

The Tanzania Environmental Health and Pollution Management Project (EHPMP) has been initiated as one of the measures to reduce the health risks associated with the unsafe use of mercury in Artisanal and Small-scale Gold Mining (ASGM). It aims to strengthen the institutional capacity to manage and regulate mercury use in the ASGM and to introduce alternative technologies to mercury for gold recovery in ASGM subsector that can be adopted and accepted by the ASG miners, service providers, Local communities surrounding the mining sites and Regulators. It is funded by the Global Environmental Facility (GEF) through a Grant Aid Agreement signed by the Government of Tanzania (GoT) and the World Bank (WB).

Component 3 of the project, titled: Demonstrating the Application of Technological Tools and Economic Approaches involves the selection and application of specific cleaner technologies in contaminated areas of these selected sites. One of the actions under component 3 involves the Piloting of Alternative Technology in ASGM which involves the construction of mineral processing centres equipped with personal protective equipment (PPEs) for best environmental practices. These facilities will be used as demonstration centers for the safe handling of mercury to ASGM in the project implementation Regions.

The National Environmental Management Council (NEMC), in collaboration with the Mining Commission, serves as the Project Implementation Team (PIT) for this initiative. Their objective is to establish Mercury mineral processing centers, furnished with Personal Protective Equipment (PPE), to function as demonstration sites for the safe management of Mercury in Artisanal and Small-scale Gold Mining (ASGM) areas across seven (7) selected regions with the highest ASGM activity. These centers aim to increase awareness and knowledge among ASGM miners regarding the safe handling of mercury, thus fostering sustainable and responsible practices in gold extraction.

To align with the World Bank ESF requirements and the Environment Management Act of 2004, the Project Implementation Team (PIT) under the National Environment Management Council (NEMC) has engaged an Individual Environmental Expert, Eng. Anael Macha, to undertake Environmental and Social Impact assessment (ESIA) study of the proposed demonstration minerals centers in Shinyanga and Singida Regions.

1.2 PROJECT RATIONALE

The mineral sector is currently contributing 5.2% of the country's Gross Domestic Product (GDP), the bigger share being gold. The Tanzanian gold mineral sector comprises two subsectors: the Large-Scale Mining (LSM) subsector, which is associated with large Foreign Direct Investment

(FDI), infrastructure development, technology transfer, high productivity, and high export earnings. The second subsector is Artisanal and Small-Scale Mining, 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.

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

The gold processing and recovery method deployed by ASGM is dominated by the use of mercury due to its affordability, and ease of use. Mercury is used to separate gold from other minerals/materials in the mined ore due to its ability to bind to gold and form an amalgam. Mercury is released into the environment during amalgamation, separation of amalgamation from pan water, which causes an impact on the environmental and human health and safety. Due to the importance of ASGM in supporting both the country's GDP and livelihoods, this project has been initiated to assist in reducing the risks while looking for alternative technologies.

1.3 ESIA OBJECTIVES

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

- To obtain an EIA certificate by the Environmental Impact Assessment and Audit Regulations of 2005 as Amended in 2018
- Identify and evaluate the significant environmental impacts of the proposed project.
- To determine the compatibility of the proposed project of improved gold ore processing and washing facilities with the neighboring land use
- Formulation and incorporation of Environmental Management and Monitoring Plan during project implementation/construction, operation, and decommissioning phases

- To comply with the financiers' requirements which have been narrated in the project Environmental and Social Management Commitment Plan

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

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

NEMC is committed to conducting its activities in compliance with the safety standards and protecting its natural and human environment on a long-term basis. As per Mining Act of 2019 and the Mining (Safety, Occupational Health and Environment Protection) Regulations, 2010, projects of these categories require an Environmental Impact Assessment before commencement which provide a practical way in which a proponent can demonstrate an understanding of environmental regulations, practices and procedures required to reduce or eliminate the potential environmental effects of the project.

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

1.4 METHODOLOGY

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

1.4.1 Document Review

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

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

1.4.2 Field Visits

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

1.4.3 Stakeholder Analysis and Consultation

Identification of persons/groups who have a vested interest in the project allows for knowledge of vulnerable or influential stakeholders. Stakeholder engagement allows for the disclosure of project information and the inclusion of stakeholders' views/concerns/impacts on the project in the design and ESMP. The project Stakeholder Engagement Plan is the key document guiding stakeholder identification, categorization, and engagement at the project sites. To ensure that engagement is free, prior, and informed then the team will send notification

(Official letters, notices, electronic mail, or via phone) with the agenda at least a week before the engagement date.

Annex I of the SEP has already identified some of the key stakeholders to be included in the study. At minimum stakeholders to be consulted will include host communities, LGAs at village, ward, district, and regional levels, and sectoral regulators e.g. Forests, Water. For health and gender matters RMO, DMO, medical personnel, police, NGOs, local schools, local health facilities, and ASGM groups. Consultation methods to be applied will include consultative meetings, interviews; focus group discussions; and meetings depending on the category of stakeholder and availability.

1.4.4 Field Surveys

To establish the existing hydrology, hydrogeology, vegetation, and wildlife types and species in the area random and transect walks and interviews with community members who utilize ecosystem services for various activities e.g. wood/timber gathering, herbalists, and hunters were undertaken. GPS coordinates and photographs were taken for reference once back in the office and for inclusion in the study.

1.4.5 Impact Identification and Assessment

Some of the potential impacts of this project are narrated in section 3.1 of the ESMF and will be included. Due to its simplicity, the Leopold Matrix was used to identify the Valuable Ecosystem Components that will interact with the project. The criteria used for impact assessment at minimum included type (+/-), scale, duration, magnitude, reversibility, and probability of occurrence. The Consultant considered Table 1 and Annex II included in the project ESMF for significance rankings. Matrices that aid in assigning a value to the criteria for impact assessment to establish significance also were adopted as long as they align with ESMF Annex II included in Appendix IV.

1.4.6 Mitigation, ESMP, and Monitoring

Statutory requirements (particularly the EIA and Audit Regulations of 2005 as Amended in 2018), WB ESMF, best practices and guidelines for similar projects, and context will be the main criteria used to propose mitigation, management, and monitoring requirements for the project. The proposed mitigation measures will take into consideration the receiving environment, technological feasibility, local applicability, and social acceptance of the proposal. The ESMP chapter is presented in accordance with Annex IV of the ESMF however, as already the ESIA report which will adopt the format required in ESMF Annex III, item 2: Project Description will not be repeated in the ESMP section.

1.5 SCOPE OF THE PROJECT

The scope of this study is as guided by the Environmental Impact Assessment and Audit Regulations of 2005 and its Amendment of 2018 and the terms of reference (ToR) and scoping report that were approved by NEMC on 30th April 2024 via screening decision letter with reference number HD./145/259/106/02. The ToR approval letter from NEMC is appended in Appendix II of this report.

1.5.1 Spatial Boundaries

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

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

1.5.2 Temporal Boundaries

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

1.5.3 Institutional Boundaries

Institutional boundaries in this context pertain to the institutions and sectoral boundaries within which the project is situated or mandated. The project involves the construction of gold ores processing and washing facilities to be used as demonstration centers by ASGM around Mwime village. The relevant institutions and administrative units of interest in Tanzania are listed below.

Institutions (Regulatory and Service Organizations)

- Ministry of Water
- Zonal NEMC Office – Lake Zone
- In-land Basin Water Board

- Government Chemistry Laboratory Agency (GCLA)
- Fire and Rescue Offices
- Occupational Safety and Health Authority (OSHA) Central Zone

Administrative Units

- Mining Commissioner
- Regional Commissioner
- Singida Regional Office
- Iramba Municipal Council
- Resident Mines Officer (RMO) Office
- Ntwike Ward
- Nkonkilangi Village Council
- Sekenke One Mining Co. Society Ltd Site (Private Mining Company)

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

1.6 SCOPING TERMS OF REFERENCE

The terms of reference for this study covered the requirements under the Environmental Impact Assessment and Audit Regulations and the World Bank Environmental and Social Standards specifically:

ESS 1: Assessment and Management of Environment Risks and Impacts

ESS 2 Labor and Working Conditions

ESS 3: Resource Efficiency and Pollution Prevention

ESS 4: Community Health and Safety

ESS 10: Stakeholder Engagement and Information Disclosure

1.7 PRELIMINARY STUDIES

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

1.8 STRUCTURE OF THE REPORT

This report is structured according to the requirements under the EIA and Audit Regulations of 2005, it contains the following chapters:

- **Chapter One:** contains the introduction to the background information of the proposed project, its rationale, and the proposed project implementation arrangements.
- **Chapter Two:** contains the project description, in which there is a description of the location and relevant components of the project and their activities.
- **Chapter Three:** illustrates policy, legal, and administrative framework, which are the relevant Tanzanian environmental policies and legislation applicable to the existing projects including WB ESS and General EHS Guidelines.
- **Chapter Four:** describes the area of influence and relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences.
- **Chapter Five:** expresses the consultation exercise at the project area detailing the list of stakeholders consulted and the issues raised Stakeholder engagement plan, Grievance Redress System
- **Chapter Six:** describes the environmental impact assessment and identification of relevant environmental and social risks and impacts of the project. This will include the environmental and social risks and impacts specifically identified in ESS2–8, and any other environmental and social risks and impacts arising as a consequence of the specific nature and context of the project, including the risks and impacts identified in ESS1, paragraph 28. It should include positive environmental and social outcomes as well. of Alternatives.
- **Chapter Seven:** describes mitigation measures for the potential negative impacts. Identifies mitigation measures to manage the environmental and social impacts and significant residual negative impacts that cannot be mitigated and, to the extent possible, assesses the acceptability of those residual negative impacts. Identifies differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable. Assesses the feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of proposed mitigation measures, and their suitability under local conditions; and the institutional training, and monitoring requirements for the proposed mitigation measures. Specifies issues that do not require further attention, providing the basis for this determination. Covers Environmental and workers' health and safety measures. Includes a monitoring plan identifying parameters to be monitored, frequency, and responsible authority.

- **Chapter Eight:** presents the Environmental and Social Management Plan (ESMP). Identifies key measures and actions and the timeframe required for the project to meet the requirements of the ESSs. This will be used in developing the Environmental and Social Management Plan (ESMP).
- **Chapter Nine:** presents the Environmental Monitoring Plan that contains the proposed institutions to carry out the monitoring activities, the monitoring indicators, the time frame, and the proposed budget for monitoring.
- **Chapter Ten:** gives the cost-benefit analysis of the project.
- **Chapter Eleven:** provides the conceptual decommissioning plan for the proposed project.
- **Chapter Twelve** gives the summary and conclusion of the assessment.

Annexes:

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

2 CHAPTER TWO: PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND ACCESSIBILITY.

Sekenke One Mining Co. Society Ltd Site is located at coordinates (04°15'49.7' 'S, 34°09'57.8''E) administratively being within Nkonkilangi Village, Ntwike Ward in Iramba district, The site can be accessed by driving 100 km north from Singida Town on the Dar to Mwanza tarmac highway and branching off at Shelui Centre and then driving about 14kms on an all-weather gravel road to Nkonkilangi village center where the site is located, as is indicated on Figure 2-1. The site is almost 7km from Nkonkilangi village center.

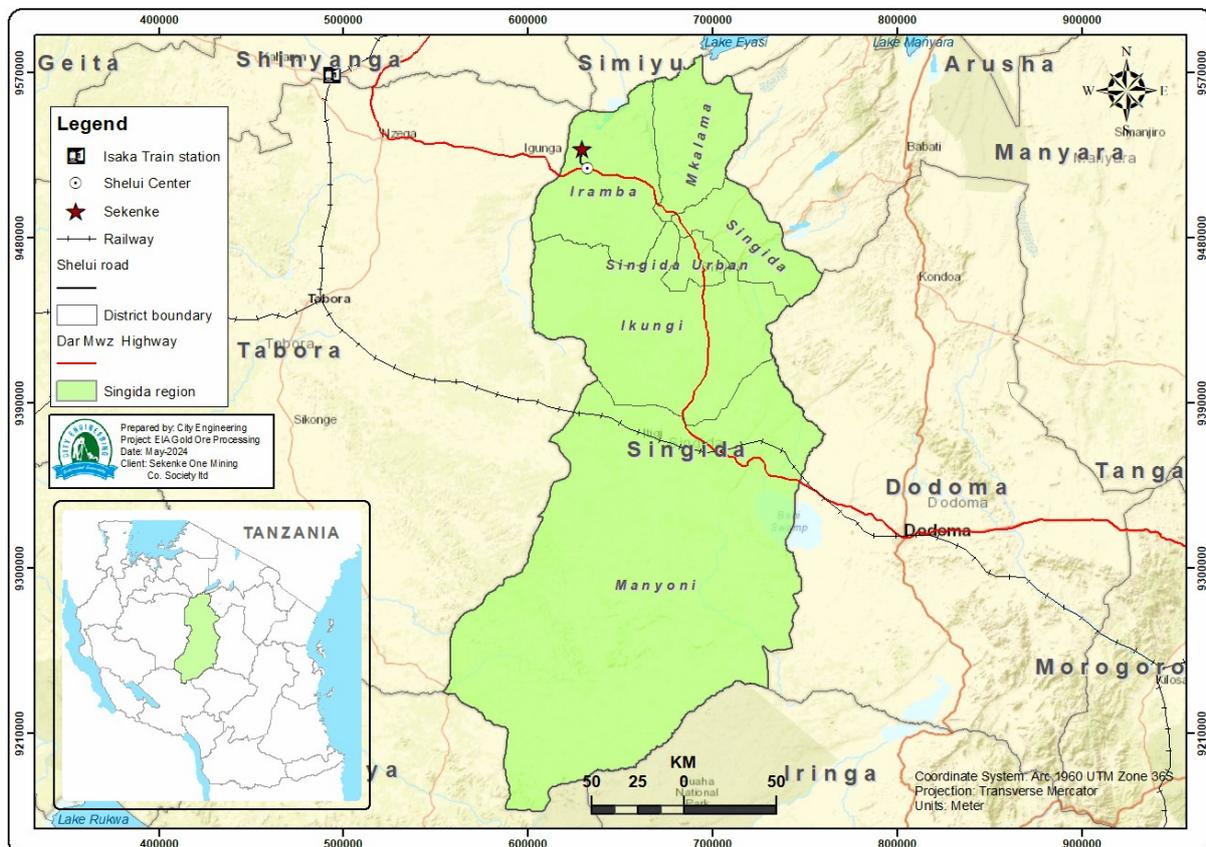


Figure 2-1: Project Accessibility

2.2 LAND OWNERSHIP AND LAND USE

The area provided by the PML owners for construction of the Gold Ores Facility is within an area used exclusively for gold mining and processing. Sekenke One Mining Co-operative Society Ltd owns a Primary Mining Licence PML006315CZ that was renewed on 27th May 2023 for a period of 7 years. (Attached on Appendix I). It is within acacia woodland as there were many mature trees left standing with underbrush patches largely cleared to support different mining, processing, ore, and tailing storage for the various shafts operated by the members that make up the society. The specific site consists of partly cleared land that was formerly

used for surface and shallow pits mining as shown on Figure 3-2. It is surrounded on all sides by mining shafts and processing facilities. The site representative informed that the area provided is about 100m long and 100m wide, which is equal to 10,000 m². However, the project footprint will only cover 64 m² as per attached layout plan.

Surface right ownership is by the cooperative who said they also own the PMLs. The site representative informed the team that they have a land sale agreement and there is no land ownership conflict. Adjacent to these PMLs, there are other mining sites.



Figure 2-2: Proposed site

2.2.1 Site Selection

The project used the following exclusion criteria that required the PIT to screen the project site, ensuring that project sites will NOT:

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

- xi. The site for locating the demonstration pilot will be selected in consultation with the stakeholders and will be one that is easily accessible to artisanal small-scale miners.

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

2.2.2 Declaration of the Project Area

The project site is away from sensitive environmental features (i.e., not within a protective area, at least 60M from natural water sources as per Environmental Management Act (EMA) 2004 and at least 200M from residential as per Mining Act 2010). If a site did not meet the key criteria, it was not considered further for project implementation.

2.2.3 Current Gold Processing Operations

The current ore processing process is the conventional crush–mill–extract process common in ASGM operation. The process flow is as indicated in Figure 3-3 with the VAT leaching of tailings occurring offsite. The site has 30 gold ore processing and washing facilities (Mialo) and 30 crushers/ball mills to crush and grind mined rock materials. It was not mentioned how many areas were available for mercury panning and amalgam burning which was said to be done individually by the shaft owners in cases within the shaft shed. After completion of this project, it is anticipated that all shaft owners and potential future owners will adopt this technology for gold processing.

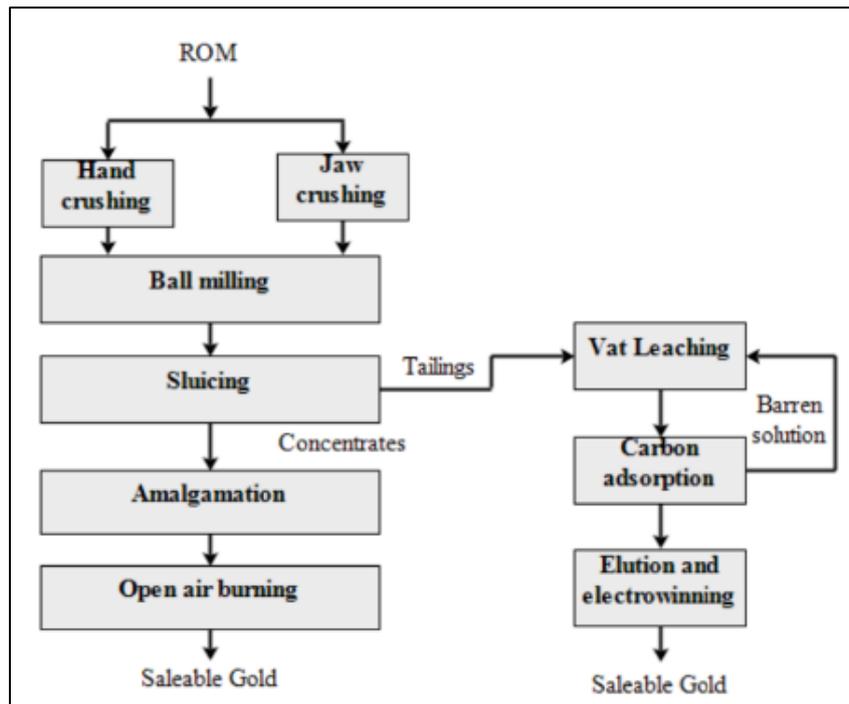


Figure 2-3: Current Gold Ores Processing at ASGM Sites¹

2.2.3.1 Ore Crushing

2.2.3.1.1 Hand Crushing

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

2.2.3.1.2 Jaw Crusher

After hand crushing, the smaller pieces of ore about 20cm are fed into a jaw crusher, a mechanical device that uses two metal plates to crush the ore into finer parts which has the capacity of around 30HP running on diesel engine for gold ore crushing. One plate is stationary while the other moves back and forth, crushing the ore against the stationary plate to produce fine particles about 0.25cm.

2.2.3.1.3 Milling

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

¹ [\(PDF\) Situational Analysis of Gold Processing Practices at Artisanal and Small-Scale Gold Mining in Tanzania \(researchgate.net\)](#)

2.2.3.1.4 Sluicing

The milled ore is then subjected to sluicing, a gravity concentration method. The fine ore powder is mixed with water and passed through a sluice box, which is a long, inclined trough. As the slurry flows down the sluice box, heavier gold particles settle to the bottom, trapped by other obstructions, while lighter waste material flows out of the box. Sluicing helps concentrate the gold particles, separating them from the bulk of the ore.

2.2.3.1.5 Amalgamation

In the amalgamation stage, Wet gold concentrates are mixed with liquid mercury and panned for several minutes to produce gold amalgam which is formed after mercury binds to the gold. The remaining mercury is then squeezed out, through a cloth, and reused.

2.2.3.1.6 Open Burning

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

2.2.3.1.7 VAT Leaching/CIP

Once the ore has undergone the conventional crush-mill-extract process with the washing bay, the remaining tailings, which still contain residual gold, are stabilized and scheduled for further processing through VAT/Carbon-in-Pulp (CIP) plants. After gold recovery, the remaining inert material is carefully managed and deposited in engineered Tailing Storage Facilities (TSFs) associated with the CIP operation. This approach ensures that residual gold is efficiently recovered while maintaining long-term environmental safety through secure containment of the final waste

2.3 PROPOSED GOLD ORES PROCESSING COMPONENTS

Figure 2-4: Proposed Gold Ore Processing Plant Layout (Site layout) and Appendix IV (Conceptual design) present the proposed facilities for gold ore processing. The design will include the following components: -

- Crushing area (hand machine)
- Ball mills
- Sluice Table
- Amalgamation pond
- Tailing storage area
- Electric motors or Diesel Engine
- Oil spillage compartments

- Water tank
- Mercury-contaminated tailings Storage area
- Mercury contaminated water storage area
- Sluice Box
- Baffle walls
- Settling Pond

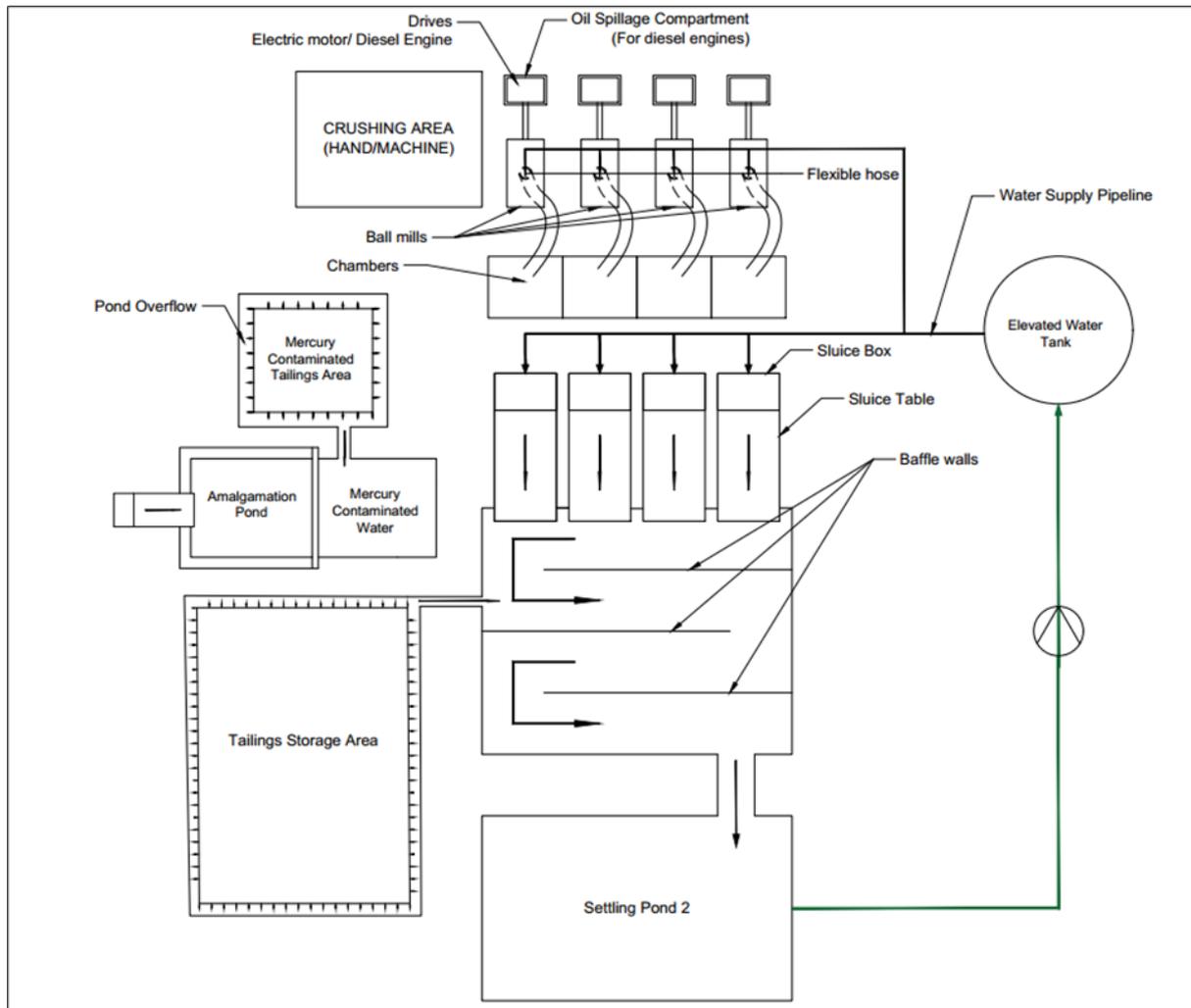


Figure 2-4: Proposed Gold Ore Processing Plant Layout

Source: City Engineering Co Ltd

2.4 PROJECT PHASE AND ACTIVITIES

The proposed project is structured into several phases, each containing a unique set of activities essential for successful implementation. These phases serve as the blueprint for navigating the project towards its intended outcome

2.4.1 Pre-construction phase

This stage involves site investigations including environmental baseline studies conducted by the National Environmental Management Council (NEMC) to gather data on air, soil, water, and noise quality at various sites. Additionally, stakeholder engagement was undertaken, involving Regional Administrative Secretaries, Miners' Associations Leaders, Local Government Authorities spanning from village to district levels, PML Owners, Miners, and Resident Mines Officers (RMO). Subsequently, the Project Implementation Team (PIT) conducted a site selection exercise in July and August 2022. Sites provided by the Mining Commission will be within active Artisanal and Small-Scale Gold Mining (ASGM) areas, including licensed sites under the Mining Act of 2010 (revised in 2019) and recognized Gold Rushes. Selection criteria will comprise site activity levels, minimum miner thresholds, presence of mining infrastructure, and historical operational profiles. This process ensures the identification of suitable sites for subsequent construction activities.

In this phase, the design parameters, and specifications for components in section 2.3 will be developed by the design team and submitted for approval.

2.4.2 Mobilization phase

The mobilization will mainly involve the deployment of required construction materials, tools and machinery for the work and recruitment of the construction crew. This 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.

2.4.3 Construction phase

During this crucial stage, the construction of gold ore processing facilities entails a series of planned activities aimed at ensuring operational efficiency and environmental sustainability. Tasks include the establishment of foundational elements such as sluices, VAT leaching tanks, drainage, and amalgamation pools, vital for ore processing. Additionally, efforts are focused on the rehabilitation of degraded land through strategic landscaping and tree-planting initiatives, promoting ecological balance. The deployment of heavy equipment is carefully to streamline construction processes, this phase underscores a commitment to excellence, sustainability, and responsible resource management, laying the groundwork for future success.

2.4.4 Operational phase

In the operational phase of gold ore processing, a systematic series of activities is conducted to extract and refine precious metals with efficiency and precision. Initially, the process begins

with ore drying to reduce moisture content and improve processing efficiency. Subsequently, hand hammer crushing is employed to break down the ore into smaller particles suitable for further processing. Following this, grinding and milling operations are carried out using crushers to achieve the desired particle size distribution necessary for effective extraction. A reliable power supply is essential to sustain these operations.

Once the ore reaches the desired particle size, sluicing techniques are used to separate gold particles from other minerals and impurities. This process requires careful monitoring and adjustment to optimize recovery rates while minimizing losses. Subsequently, the amalgamation process combines gold particles with mercury to form a gold amalgam. This amalgam undergoes a purification process to remove mercury and impurities through controlled heating, ensuring high-quality gold refinement.

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

2.4.5 Decommissioning Phase

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

2.5 PROJECT UTILITIES

2.5.1 Human Resources

The Sekenke One mine site has more than 400 people involved in daily small-scale mining operations. There is a designated operations manager and one HSE officer who oversees the daily operations. Most of the workers engaged do not have a formal contract and are paid a day's wage attached to performance targets.

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

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

Hence, assuming that the same crew will work at both sites in the region, hence the total labour requirement at the site will be 95.

It has been decided that migrant workers will be limited and contracting will be done locally. Also, the few skilled workers e.g. construction supervisors and fabrication crew will not be housed onsite but will seek rental accommodation within proximity.

2.5.2 Water Sources

The water used for gold ore processing operations is obtained from the mining shafts from the dewatering operations.

2.5.3 Power Sources

The project site is located near the national grid, which can be utilized as a primary power source, consistent with current practices. Additionally, diesel generator sets with up to 1 MVA capacity are available to provide supplementary power.

2.6 WASTE MANAGEMENT

Currently, domestic waste at the mine sites is either disposed of on land or in shallow pits. There is limited recovery of plastics, particularly water bottles, because, according to the team, there is no market for them. There is no system in place for managing hazardous waste, especially materials that have come into contact with mercury.

2.6.1 Non-Hazardous Wastes

Waste expected during construction and operational phases may be categorized as domestic wastes (food remains, plastic bottles, excreta), hazardous wastes like scrap metals, and chemically contaminated wastes. Management of food remains will be done by composting, plastic bottles will be collected and taken by plastic recyclers, and scrap metals will be sold to certified dealers.

Wastewater from the panning process will pass through sedimentation chambers as already established on the existing panning areas and then reused. Domestic Excreta should be managed on-site by using either a pit latrine or a septic-soak-away system.

2.6.2 Hazardous wastes

Tailings and water in the amalgamation pool will contain traces of mercury. The tailings will be stored on tarpaulins with drainage channels to prevent water inflow, while rainwater will be collected and reused in the production process. Afterwards all tailings will be channeled through VAT leaching plant, and the resulting tailings are usually sold to downstream clients who recover Silver. The design should consider a simple cost-effective tailings facility that can be shared with all the gold rush members.

The amalgamation pool will be placed inside an enclosed building and water reused. Chemically contaminated wastes should be disposed of as per guidelines set in the Environmental Management (Hazardous Waste Control and Management) Regulations, 2021 preferably bags holding VAT leaching chemicals will be returned to chemical suppliers.

To manage mercury emissions from amalgam burning the use of retorts will be enforced by the RMO.

3 CHAPTER THREE: ADMINISTRATIVE INSTITUTIONAL AND LEGAL FRAMEWORK

3.1 INTRODUCTION

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

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

Along with this, this chapter outlines an overview of the Tanzania administrative framework, key legislative requirements, and relevant international best practices applicable to the proposed construction of the Gold Ore Processing and Washing Facilities at Sekenke One Mining Co. Society Ltd Site

3.2 ADMINISTRATIVE INSTITUTIONAL FRAMEWORK FOR THE MANAGEMENT OF THE ENVIRONMENT

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

is provided based on key relevant sectors related to the undertaken project. See the figure below

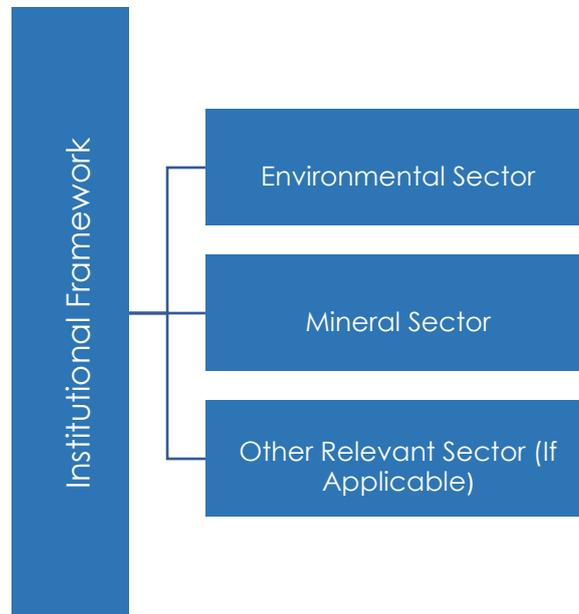


Figure 3-1: Institutional Framework Structure

3.2.1 Environment Management Administration Framework

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

Table 3-1: Institutional Arrangement for Environmental Management

Ministry/Institution	Role
Vice President's Office (Division of Environment)	This Division has the overall responsibility of planning and implementing all environmental matters, including approvals of SEA and EIA certificates. It also formulates environment management regulations and provides related permits i.e. Hazardous Waste Management Permits
Ministry of Minerals (MoM)	<ul style="list-style-type: none"> Formulate and implement policies for the sustainable development of the mineral sector. Oversee the issuance and management of mining licenses and permits. Monitor compliance with mining laws, regulations, and standards.
Ministry of water	<ul style="list-style-type: none"> Develop and implement national policies and strategies for water resources management.

Ministry/Institution	Role
	<ul style="list-style-type: none"> ● Oversee policy and legislative aspects of integrated water resources management. ● Appoint members of the National Water Board. ● Establish and supervise basin water boards. ● Facilitate sectoral coordination and planning on issues impacting water resources.
Mining Commission (MC)	<ul style="list-style-type: none"> ● Enforce the requirements of Mining Act RE 2019 and EMA 2004 by requiring EPP and EIA to form part of PML license applications ● Enforcement of laws and regulations for mining and protection of the environment in all licensed areas; ● Environmental monitoring and auditing of the various exploration and mining activities; ● Mining projects EIS & EMP approvals (through a multi-sectoral committee under the NEMC); ● Managing resettlements in Mining areas (through the Ministry of Lands and Housing Settlements); and ● Mining conflict resolutions.
National Environment Management Council (NEMC)	<p>The National Environment Management Council (NEMC) will be the primary agency responsible for the satisfactory implementation and monitoring of the ESMF. In doing this, NEMC will work in close association with relevant regional, district, or local levels – the Local Government Authorities (LGA).</p> <p>As per Environmental Management Act No. 20 of 2004, NEMC will be responsible for reviewing and monitoring Environmental Impact Assessments (EIA), and enforcing compliance with the project-approved ESMP</p>
Occupational Safety and Health Authority	<p>OSHA was set up in 2001 under the Ministry of Labour, Youth, Employment, and Persons with Disability to administer occupational health and safety at workplaces in the country. This Ministry is the main actor with the oversight role of ensuring that decent work is practiced and maintained in Tanzania. It provides directives, and technical advice, enforces legislations, proposes amendments, allocates resources, oversees all activities carried out by OSHA, and ensures that OHS rules and regulations are adhered to and maintained at workplaces.</p>
Basin Water Boards	<p>They appoint members and chairpersons of catchment and sub-catchment committees which are responsible for the management of water sources. Responsible for monitoring pollution and subsequent prevention measure</p>
Government Chemist Laboratory Authority (GCLA)	<p>GCLA is under the Ministry of Health and it is mandated to ensure that all chemicals that are imported and used in the country are regulated. This includes the issuance of importation and transport permits. Mercury is one of such chemicals that are regulated.</p>

Ministry/Institution	Role
President's Office – Local Government and Regional Administration	<p>Regional Level</p> <p>Advice on environmental implementation and enforcement of legislation to the project operations</p> <p>District Level</p> <ul style="list-style-type: none"> ● The District Commissioner as the Chairperson of the District Security Committee is responsible for ensuring security and also the resolution of grievances ● The District Environment Management Officer (DEMO) is responsible for environmental matters in the district. This includes issuing non-hazardous waste permits and inspection of facilities within the district. He is the main connection between the district and NEMC and VPO-Environment ● The District Social Officer is responsible for following up on gender and youth matters ● The District Community Development Officers register and follow up on the establishment of cooperatives and development groups in the district <p>Ward and Village Levels</p> <p>The Village Executive Officer and Ward Executive Officers are responsible for receiving, organizing resolution forums, and escalating grievances to the district-level</p>
NGOs	<p>The Government's drive to formalize prospecting and Primary Mining Licenses and to stimulate the support by various NGOs to the small-scale miners has been effective in giving the small-scale sub-sector a stronger voice and further influence over policy, legislation, and implementation procedures.</p>
Miners Associations	<p>These association are responsible for advocating gender equality, capacity building, and equitable participation of women. Additionally, they ensure women are represented in decision-making processes to safeguard their rights and improve working conditions. Also, the influence of individual societies, associations, faith groups, and other organizations is recognized by the government and the mineral sector, and some bodies, like the Lawyers Environmental Action Team and Policy Forum, have played key roles in advocating changes to recent draft legislation. Other groups (TAWOMA, AFWIMM, and WIMA) have lobbied for fairer treatment of women miners and processors.</p>
Project Site	<p>The Mine Manager and his assistants the HSE Officer and Fundi are overall responsible for the day-to-day welfare of employees. Mine Resident Officer (MRO) who oversees all operations on behalf of the Mining Commission is always on site and ensuring compliance with HSE requirements forms part of their portfolio</p>

3.2.2 Administration at the ASGM Sites

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

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

3.3 PROJECT LEGAL FRAMEWORK

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

3.3.1 Relevant Policies

The sections outline the policies to be considered when implementing the proposed project which guided managing the project by assessing where and how project development could be suitable and ensuring projects progress without negatively impacting the environment and the well-being of communities.

3.3.1.1 The National Environmental Policy (NEP), 2021

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

3.3.1.2 The National Mineral Policy, 2009

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

3.3.1.3 National Health Policy 2003

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

3.3.1.4 The National Water Policy (2002)

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

3.3.1.5 The National Occupational Health and Safety Policy, 2009

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

commencing work a designated HSE representative will be selected to conduct thorough inspections of all employees to ensure they put on their PPEs.

3.3.1.6 The National Land Policy (1995) Second Edition 1997

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

3.3.1.7 The National Gender Policy (2002)

The policy advocates for gender equality and empowerment and an inclusive institutional framework to ensure gender-sensitive planning and decision-making processes in sectors including the mining sector. It emphasizes the importance of equitable access to education and training, equipping women miners with the skills and knowledge required for modern, safe, and environmentally friendly mining practices. Legal and human rights are prioritized, ensuring that women miners are protected from exploitation, gender-based violence, and discrimination, while also guaranteeing their fair share in ownership and access to resources, such as land, mining plots, and financial credit. Additionally, it addresses employment equity, calling for fair recruitment and decent working conditions for women in mining activities, and highlights the need for improved general and reproductive health services, as well as HIV/AIDS prevention in mining communities. The policy also calls for gender mainstreaming and community participation, ensuring women are included in discussions and decision-making at all levels.

The Gold Ore Processing project must ensure gender inclusion, women's active participation in decision-making, provide equal access to resources, training, employment opportunities, and adopt fair labor practices.

3.3.1.8 The National Trade Policy 2003 (Edition 2023)

Section 3.12.1 of the policy addresses the environmental and social challenges associated with trade activities. The policy emphasizes minimizing negative environmental and climate change impacts by encouraging sustainable practices in resource extraction, processing, and waste management. Additionally, the policy recognizes the social implications of trade, such

as the risk of trade-induced HIV/AIDS transmission in section 3.12.2, particularly in mining communities where transient workforces and economic disparities can increase vulnerability. It stresses the importance of integrating health interventions and awareness programs to reduce the spread of HIV/AIDS, ensuring that the workforce and surrounding communities are protected from its adverse effects on trade and development.

To comply, the proponent should implement environmentally sustainable technologies, such as energy-efficient machinery and effective waste management systems, to minimize ecological damage. Conducting regular environmental audits and adhering to national and international environmental standards is crucial. To address HIV/AIDS risks, the proponent should establish workplace health programs, including awareness campaigns, access to testing and treatment services, and support systems for affected individuals. Partnering with local health organizations and engaging communities in preventive initiatives will further align the project with the policy's objectives.

3.3.1.9 The National Five-Year Development Plan 2021/22 to 2025/26

This plan emphasizes the nation's multisectoral development goals aimed at achieving the National Development Vision 2025. The plan underscores the importance of increasing the country's production capacity, which directly relates to advancing the mining sector. It highlights the need for robust infrastructure, such as roads, railways, energy, and water systems, essential for the smooth operation and logistical support of mining activities. FYDP III promotes a competitive economy by fostering an enabling business and investment environment, aligning with the gold processing industry's demand for private-sector participation and innovation. Furthermore, the plan emphasizes industrialization, trade, and investment to boost Tanzania's role in regional and global trade, which is relevant for maximizing the export value of processed gold. The focus on skills development and integrating research with economic activities ensures a steady supply of skilled labor and innovative practices to enhance the efficiency and sustainability of the project. Thus, the gold ore processing project contributes to and benefits from the strategic objectives and interventions outlined in FYDP III.

3.4 LEGAL FRAMEWORK

This section gives a summary of the legislation that governs environmental management in the health sector and other related issues that should be included in the Environmental Impact Assessment (EIA) of the construction of Gold Ore Processing and Washing Facilities at Sekenke One Mining Co. Society Ltd Site to ensure sustainable compliance.

3.5 LEGISLATION

Mining activities in Tanzania are governed by the Mining Act of 2010 as revised in 2019 which provides access to minerals to Artisanal and Small-Scale Miners by requiring them to operate in areas that are under Primary Mining Licenses. The act also has the Mining (Environmental Protection for Small Scale Miners) Regulations of 2010 which describe the minimum health, safety, and environmental protection requirements and standards for ASGM. The environmental management of ASGM is regulated by the Environment Management Act 2004 (EMA), through the Environment Impact Assessment and Audit Regulations of 2005 as amended in 2018, ASGM activities need to obtain an EIA certificate and implement an Environment and Social Management Plan. However, during the field visit it was observed that most of the ASGM operations still follow the Mining (Environmental Protection for Small Scale Miners) Regulations of 2010 even though there was awareness that they need to adopt the EMA 2004 requirements. Table 2-1 Outlines the key legislation that ASGM needs to follow and their relevance to this project.

Table 3-2: Legislation that Governs the Project

Legislation	Description	Relevance to the Project
Mining Act RE 2019		
<p>Section 55. Grant and Validity of a Primary Mining License</p> <p>Mining (Mineral Rights) Regulations 2018 reg 7(g) Area of PML</p>	<p>provides small-scale miners with the opportunity to acquire PMLs with access to not more than ten (10) hectares granted for seven years and can be mortgaged, renewed, or transferred to another holder</p> <p>subjects the PML holders to follow regulations pertaining to Health and Environment protection</p> <p>allows to stack or dump minerals or waste in line with applicable regulations</p>	<p>All the project areas had PMLs</p> <p>Has a designated HSE Officer and Fundi</p>
<p>Section 64. Abandonment</p>	<p>Provides procedure for abandoning land under a mineral right which includes application to the chief mining inspector 90 days before abandonment. If approved then abandonment conditions should be adhered to. The certificate does not remove liabilities incurred prior to the certificate</p>	<p>Areas in which mining has ceased may be abandoned but environmental liabilities need to be cleared</p>
<p>Section 87. Royalties</p>	<p>Requirements to pay royalties at gross Value of Minerals</p>	<p>The Cooperatives at the sites should ensure the gold recovered from the plant is subjected to royalties</p>
<p>Section 95. Restrictions on the right of entry by mineral right holder</p>	<p>Need consent from LGA responsible and lawful occupier to exercise mineral rights for land within 200m of residential 100m from crop farms</p>	<p>The site is located within a natural woodland area outside the village</p>
<p>Section 96. Be reasonable when exercising mineral rights</p>	<p>Ensure activities are not injurious to land occupiers or other land users</p> <p>Rightful occupiers are not to hinder access or erect buildings without consent of the mineral right holder</p> <p>Compensate for land disturbance/property damage</p>	<p>The site being within the PML and not being utilized for other purposes. It is off an established access road and within the site a track is already present</p>
<p>Section 97. Compensation, relocation, and resettlement</p>	<p>Fair and reasonable compensation in line with the Land and Village land acts at the current market value to be paid by mineral right holders cannot coexist with landowner without injuriously affecting them</p>	<p>The site selection process has eliminated this requirement as the PML and cooperatives have given the land freely. The project will use existing roads</p>

Legislation	Description	Relevance to the Project
Section 102. Provision of goods and services by Tanzanians	Mineral rights holders to have local content plans and follow up on the HSE performance of their suppliers	The Cooperatives at the sites should ensure compliance
Section 105. Corporate Social Responsibility	Mineral rights holders are to have a CSR plan that has been developed jointly with and approved by the LGA responsible for the host community and aligns with their priorities.	The cooperatives at the sites have engaged in community development activities that are priorities of the host communities and have agreement with the village government
Section 107. Compliance with Environmental Principles	<p>Mineral rights holders should comply with the environmental safeguards included in the Environment Management Act and other written laws</p> <p>Should contract a separate competent entity to manage wastes arising from operations who is permitted under the Environment Management Act 2004</p>	<p>The operations at the project sites demonstrated to follow some principles e.g. water recovery and circulation but still improvement is needed. The project should implement measures to limit emissions and discharges, separate operational impacted water and enhance mercury recovery. This ESIA ensures compliance.</p> <p>The management of wastes proposed should align with the requirements</p>
Section 109. liability of License holder for pollution damage	License holder shall be responsible for pollution damage	The cooperatives operating the sites were aware that they are liable for environmental pollution by their activities but negligence was observed especially in dewatering and storm water management
Mining (Mineral Rights) Regulations 2018 reg 16 Information and Reporting	Each year to prepare a report on the machinery available, employees, wages, minerals produced, death and accidents and submit to the Mine Commission	The project need to assign these responsibilities to the GOP administration
Mining (Designated Minerals Certification) Regulations 2019 Regulation 5. Classification and Certification of Mining Areas	<p>Provides for inspection, classification and certification of Mining Areas as part of the International Conference of the Great Lakes Region (ICGLR) Pact for designated minerals that include Gold. These classes include:</p> <p>(a) Red-flagged, where there is presence of illegal mining; illegal processing and trading of minerals and active involvement of miners under eighteen years of age in mining activities;</p>	<p>The project to ensure that the selected sites do not fall under red category.</p> <p>Most of the sites visited fell under yellow category and hence the need for this ESIA</p>

Legislation	Description	Relevance to the Project
	(b) (b) yellow-flagged, where mining or processing is legal, but there is lack of environmental management plan or protection plan; (c) (c) green-flagged, where infractions stated under paragraph (a) and (b) are not present.	
Mining (Safety, Occupational Health and Environmental Protection) Regulations 2010		
Regulation 20: Safety Precautions to be observed	Requires all persons working or supervising work at the mine to ensure safety of areas and equipment and also ensure that people are not exposing themselves to risks	The cooperatives should enforce the use of PPE and following of procedures and that works are undertaken at the designated places
Regulation 70: Mercury retorts to be sealed	Requires retorts used for gold-mercury amalgamation to be tight sealed and seals to be tested and certified by recognized bureau of standards	During stakeholder consultation it was revealed that retorts are not used and amalgam separation is done via open burning
Regulation 196: Reclamation Requirement Standards	Requires license holders to undertake environmental protection and reclamation activities throughout the operational life which is aligned to these standards	There was no proper ESMP and closure plan that was followed at the sites. Processing areas no longer used were not rehabilitated and tailings and retort ashes were just staked on the ground with no drainage. The project should include drainage, tailings/retort ashes and wash water viable solutions in its plan
Mining (Environmental Protection for Small Scale Miners) Regulations of 2010		
Regulation 3. Baseline environmental investigation and social study Regulation 4. Environmental Audit of Existing Workings Regulation 5. Review of EPP Regulation 6. Prohibition of pollution	Each PML should conduct a baseline environmental and social assessment or and Environmental Audit for existing facilities and submit an environmental protection plan (EPP). If the mining activities have significantly changed then review the EPP. It prohibits pollution and requires adherence to the Water Resources Act 2009 and Environmental Quality Standards as per the Standards Act 2009	These regulations align with the requirements of the EMA 2004 and provides for standards that the project areas are currently following
Regulation 10. Settling Ponds Regulation 11. No vegetation clearing Regulation 12. Use of Retort	These provide for the protection of water sources from sedimentation and the conservation of riparian vegetation. Requires closed retort system to be used	Cooperatives and miners in the project areas were aware of these requirements however as there was limited enforcement PPE was

Legislation	Description	Relevance to the Project
Regulation 13. Abandoned workings to be backfilled or fenced Regulation 14. Tailings disposal Regulation 15. Children not to be employed Regulation 16. Pit latrines to be constructed Regulation 17. Protective gears to be used	when heating Gold/Mercury Amalgam. Making safe abandoned pits. They prohibit engagement of persons less than 18 years and require that PPE be used to limit contact with hazardous substances	sparingly used. There were no rehabilitation or safety measures put in place for abandoned pits Workers looked to be of legal age and that was reiterated by the mine representative
The Explosives Act of 1963 The explosives regulations 1964	This governs import, transportation and use of explosives.	the blasting characteristics (materials used and patterns) will determine the size of the materials that will be mined and hence the need for manual sorting of rocks according to sizes and rock breaking which is mainly done by women.
Occupational Health and Safety Act of 2003 Part VI: Safety Special Provisions	This part requires risk assessments that cover people, property and environment be undertaken and management plans be implemented; employees not be exposed to harmful emissions; requires provision of PPE to employees exposed to hazards; and provision of eye protection in rock breaking activities	The facilities managers were not aware of requirement to undertake risk assessment. PPE was said to be provided however minimal uses and just of gumboots were observed. No measures were in place to manage emissions from retort activities. And no eye protection was provided to the women breaking the rocks. Measures need to be included in the project to comply
Employment and Labour Relations Act of 2004		
Part II: Fundamental Rights and Protection	This part prohibits child labour, forced labour, discrimination and requires employers to promote equal opportunities	All the project sites stated that no child labour was present and it was not obvious however absenteeism in primary and secondary schools due to boys engaged to work at minesites was reported. Small children were noticed at the mines while their mothers were sorting and breaking rocks. There were norms for division of work according to gender
Part III: Employment Standards	Gives minimum requirements for hours of work, rest, holidays, fair remuneration and termination	As these sites operate not under regular working hours, the exemption of the mineral

Legislation	Description	Relevance to the Project
		sector and good practice guidance should be included in the Labour Management Plan and contractor documents
Environment Management Act of 2004		
Section 81. Obligation to undertake EIA EIA and Audit Regulations amended in 2018. Regulation 5. Application and Classification of Projects	Mining activities fall under category A and B1 projects of which EIA is mandatory	Currently the PMLs do not have EIA or EA certificates to govern their operations. This ESIA is being undertaken to ensure compliance as ASGM activities fall in category B1
EIA and Audit Regulations of 2005. Regulation 42. Developer to inform council of changes in the undertaking	Obligations to inform NEMC of changes in the project	The nature of operations at the PMLs where shaft operators and ores processing facilities are frequently onboarded and develop shafts or close and abandon shafts may be difficult to continuously comply.
EIA and Audit Regulations of 2005. Regulation 46. Environmental Audit	Initial Environmental audits to be conducted on ongoing projects that commenced prior to coming into force these regulations	PML holders should undertake Initial Environmental Audits and have an ESMP that will be fit for their operations and covers all the operators on their land.
Industrial and Consumer Chemicals (management and control) Act 2003 Section 11(9) All chemicals appearing in the 6 th Schedule shall require registration	Mercury and its compounds is included in the 6 th Schedule as a chemicals that are hazardous to the environment	The project should ensure that the cooperatives operating the sites comply as they were not registered
Industrial and Consumer Chemicals (management and control) Regulations of 2020 Regulation 24. Requirements for chemical users and producers Regulation 27. Requirements for storage of chemicals	ASGM (described as a special group in first schedule item 2(1) using and storing chemicals need to be registered; Ensure the public is aware of the inherent nature of the chemicals handled at their sites; and, adhere to the code of practice and guidelines on the safe handling and use of chemicals	The project should ensure that the cooperatives operating the sites comply as they were not registered
Water Resources Management Act 2009		

Legislation	Description	Relevance to the Project
Section 23: Powers and Functions of Basin Water Boards	Bodies responsible to issue, revoke and monitor water use and discharge permits, and pollution prevention measures	The responsible water board should monitor runoff and discharges from sluicing pits these sites and encourage implementation of pollution prevention measures
Other International Guidelines		
World Bank Group Environmental, Health and safety General Guideline 2017	These guidelines offer a comprehensive framework for managing environmental and social risks throughout a project's lifecycle. They cover various topics including pollution prevention, occupational health and safety, and community health and safety.	These guidelines are key for providing benchmarks for assessing and mitigating environmental and social impacts. They support strategies like monitoring, alternative technologies, and best practices aligning with global standards
World Bank Group Environmental, Health and safety Guideline for Mining	The guideline provides benchmarks for reducing mercury emissions to air through adoption of cleaner technologies, guide implementation of pollution prevention and control measures such as improved ventilation, use of retorts, and dust suppression techniques.	These guidelines are key for providing benchmarks for assessing and mitigating airborne emissions.

3.6 RELEVANT REGIONAL AND INTERNATIONAL LEGAL FRAMEWORK

3.6.1 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

3.6.2 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.

3.6.3 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.

3.6.4 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:

- Site Preparation and Earthworks: Guidance on erosion and sediment control, soil stabilization, and managing site runoff to protect water quality.
- Emissions and Noise: Control of dust, exhaust emissions, and noise from construction equipment and activities to minimize impacts on workers and nearby communities.
- Waste Management: Procedures for the proper handling, segregation, recycling, and final disposal of construction and demolition waste (e.g., concrete, wood, and packaging).
- Management of Hazardous Materials: Safe storage, handling, and disposal of fuels, oils, paints, and solvents used during construction.
- 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.
- 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 good international practice

3.6.5 World Bank Environmental and Social Standards (ESS) 2018

As this project is funded by the World Bank, it has developed an Environmental and Social Commitment Plan which has highlighted the applicable ESS as ESS1, 2, 3, 4 and 10 as the others were removed by the site selection and screening process:

- ESS 1: Assessment and Management of Environment Risks and Impacts

As this is component 3 project an ESIA and ESMP are mandatory and environmental and social risks will be assessed through the use of E&S screening tool provided in the ESMF. All the 4 project sites are located in active mining operations and most of the risks and impacts are already preexisting and limited additional impacts are envisaged due to the implementation of the project. The project aims to influence adoption/improvement of mitigation and management measures. The project Labor Management Plan, Stakeholder Engagement Plan and Grievance Redress will form part of the ESMP. Contractor management tools included in the ESMP will also be included. The WB General EHS Guidelines and those specific for mining will inform the standards and practices that will be adopted.

- ESS 2 Labour and Working Conditions

A Labour Management Plan for the project has been developed and will be included in the ESMP. Grievance mechanisms that are easy to implement and improve the current practices observed in the field which were commended by stakeholders not to be very effective as recommended by the beneficiaries and vulnerable groups will be included in the ESMP. Practicable Occupational Health and Safety measures that can be adopted to reduce exposure and release of mercury will be recommended in the ESMP.

- ESS 3: Resource Efficiency and Pollution Prevention

The technology selected to limit generation of waste and limit pollution. A waste management plan to be part of the ESMP to govern contractor and cooperatives who will operate the pilots that is based on WB General EHS and specific for Mining and Waste Management Facilities.

- ESS 4: Community health and Safety

Issues of traffic management and emissions impacts have been identified and included in the ESMP. Information pertaining to gender issues including Gender-based Violence and child (exposure to hazardous conditions including employment and abuse) were collected during the stakeholder engagement and have informed the impact identification, assessment and will form part of the ESMP.

- ESS 8: Cultural Heritage

It ensures that projects protect cultural heritage from adverse impacts while promoting equitable access to benefits. It covers both tangible cultural heritage (e.g., archaeological sites, historical structures, sacred places) and intangible heritage (e.g., traditional knowledge, cultural practices). ESS8 emphasizes consultation with affected communities and the need for chance-find procedures during project implementation.

- ESS 10: Stakeholder Engagement and Information Disclosure

The project has developed a Stakeholder Engagement Plan that was followed during the preparation of this ESIA and will be included as part of the ESMP

4 CHAPTER FOUR: BASELINE DATA

4.1 GENERAL OVERVIEW AND APPROACH

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

- National Level: Secondary information was collected at national level to provide a high-level contextual overview of Tanzania.
- Regional Level: Secondary information was collected at the county level aimed at providing a contextual overview of Singida region.
- Project Site: Secondary and primary information was collected within the Project Site specifically within Nkonkilangi Village where the Project is located.

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

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

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

4.2 PHYSICAL ENVIRONMENT

4.2.1 Climate

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

4.2.2 Temperature

From the dataset provided, the average temperature at Iramba ranges from a minimum of 15°C to a maximum of 29°C. The hottest month is November, and the coldest month is June.

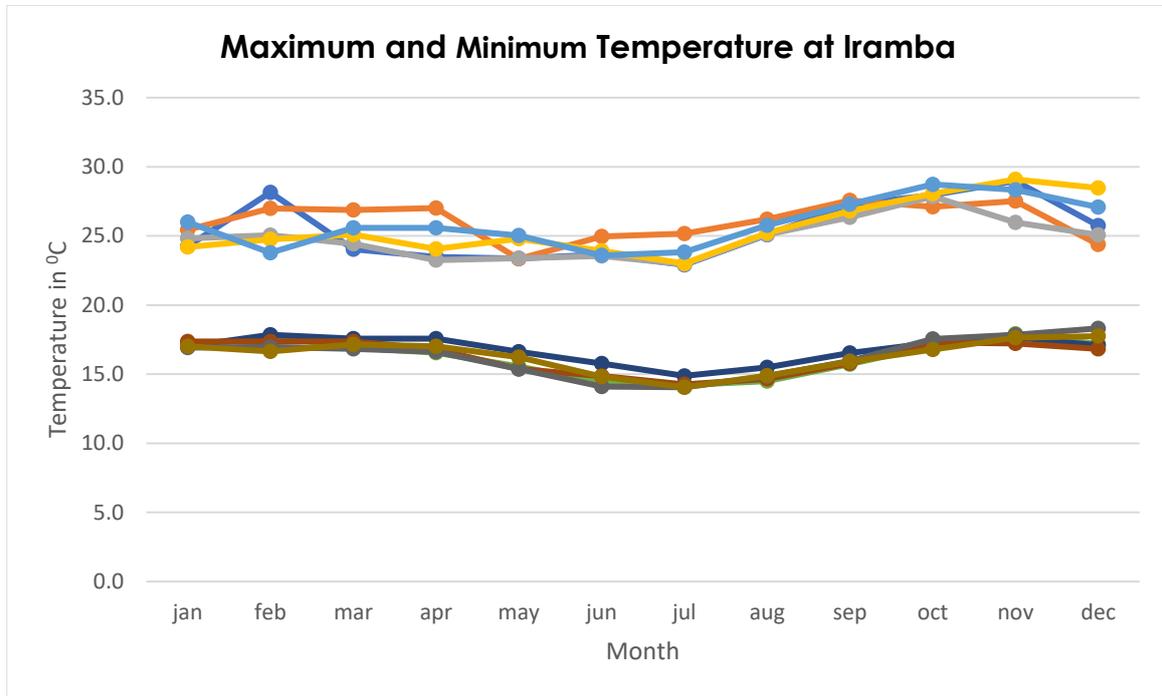


Figure 4-1: Temperature Patterns at Iramba District

4.2.3 Rainfall

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

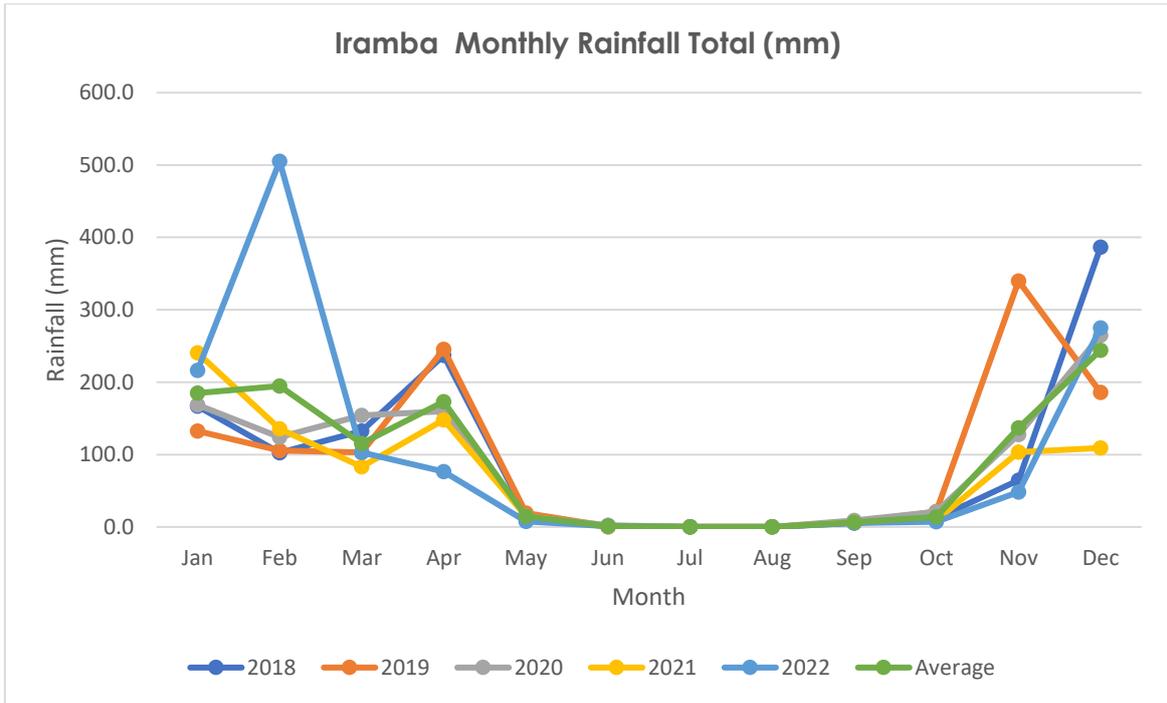


Figure 4-2: Annual Rainfall Patterns at Iramba District

4.2.4 Evaporation

On average, the monthly evaporation rate in Iramba exceeds precipitation.

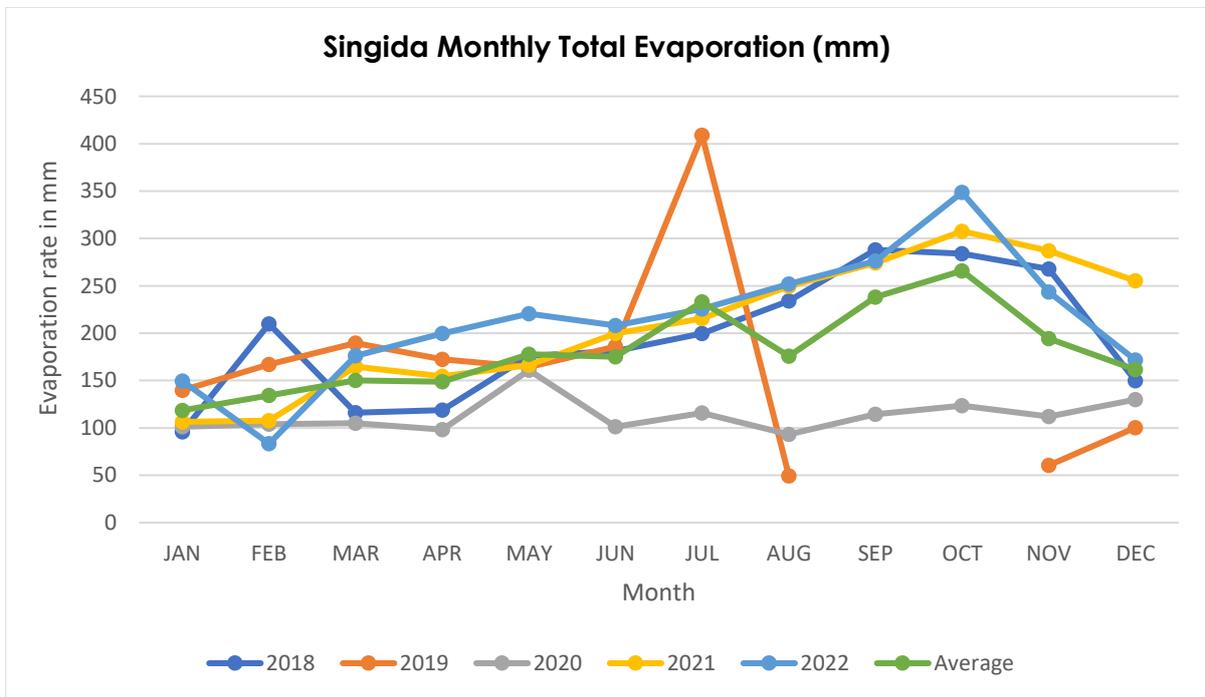


Figure 4-3: Evaporation Rates recorded in Iramba

4.2.4.1 Wind Speed and Wind Direction

Meteoblue data indicates that in the Singida region, wind blows from the southeast (SE) to the northwest (NW) for approximately 3,500 hours per year at a max speed ranging from 20-30km/h. Additionally, around 2,900 hours per year show winds blowing from the East-Southeast (ESE) to the West-NorthWest (WNW) at the same speed.

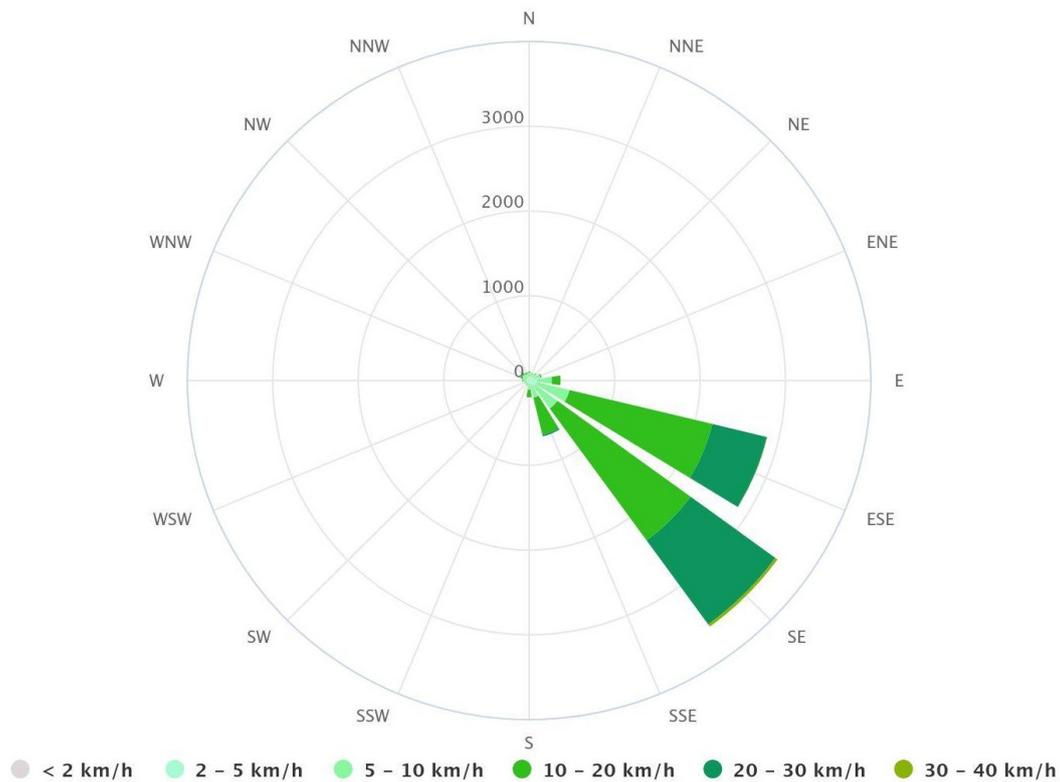


Figure 4-4: Windrose diagram presenting wind speed and direction

(Source: Simulated historical climate & weather data for Iramba Plateau - meteoblue)

4.2.5 Topography

The altitude of Iramba district ranges from 1,000 meters to 1,500 meters above the Sea level. Sekenke One Mining Company Limited carries the name of the steep escarpment that rises from the plateau between the two arms of the Great East African Rift Valley. It is mainly situated 1150m above sea level with flat and gentle slopes which end up at the Sekenke escarpment on the east.

4.3 GEOLOGY AND SOILS

The geology of Iramba District in Singida Region is dominated by ancient Precambrian basement rocks forming part of the Iramba–Sekenke Greenstone Belt within the central

Tanzanian Craton. The area is mainly underlain by granites, gneisses, tonalites, and migmatites, intruded locally by dolerite dykes and quartz veins. These crystalline rocks often appear as inselbergs and low ridges scattered across a generally flat to gently undulating plateau at elevations of about 1,200–1,500 m above sea level. Superficial deposits consist of thin layers of alluvium and colluvium, particularly in valley bottoms and depressions, with some areas containing younger Cainozoic sands and clays. The geological structure reflects a long history of weathering and erosion, producing landscapes of moderate relief with scattered rock outcrops.

Soils in Iramba are largely derived from these basement rocks and are classified mainly as loamy sands, sandy loams, and heavy clays depending on the terrain. Upland and gently sloping areas typically have reddish-brown or dark brown loamy sands with moderate drainage but low fertility, while valley bottoms and depressions contain black cracking clays locally known as *mbuga*, which are rich in clay minerals and show pronounced shrink–swell behaviour. The combination of sandy uplands and clayey lowlands defines a mosaic of agricultural potential—well-drained soils suitable for drought-resistant crops on slopes, and moisture-retentive but waterlogged soils in flats and basins. Overall, the district's soils and geology reflect its semi-arid environment and ancient basement terrain, requiring careful land management to prevent erosion and maintain fertility.

Surface soil samples were taken by the PIT at two points in Sekenke (Sekenke S18 and Sekenke S19) and tested for Mercury, Lead, Copper, and Cadmium. The level of mercury at all points was below the detection limit of 5 mg/L. However, the contaminant limit for Mercury is 2 mg/kg which is lower than the method detection limit making it difficult to comment on the current soil quality. Levels of Cadmium that were above standards were recorded at Sekenke S20 point.

4.4 SEISMICITY

Eastern and Southern Africa cover a region prone to a significant seismic hazard due to the presence of the East African Rift system. The Seismicity Hazard Map developed by the GEM Foundation and the METEOR Project Consortium included in Figure 4-6 shows that Iramba district is in an area with medium seismic potential and the potential ground accelerations is between 0.1 and 0.15g. The residents of Nkonkilangi reported that tremors are sometimes felt but without damage to mine workings and infrastructure.



Figure 4-6: Acacia woodland at Sekenke One Mine (Left) and at Nkonkilangi Village (Right)
Source: City Engineering Co. Ltd – Site Visit, November 2023

4.5.3 Fauna

The project site is surrounded by accommodation facilities, very few acacia species, frequent movement of human beings and several disturbances. Hence, no fauna of conservation significance was observed, reported by residents. However, the ongoing artisanal and small-scale mining (ASM) activities associated with the gold mining have led to significant habitat degradation, resulting in a decline in both the diversity and abundance of fauna. Continuous land clearing, excavation, soil compaction, and noise from mining operations have disturbed wildlife movement patterns and reduced the availability of shelter and food resources.

Birdlife, particularly granivorous and insectivorous species, remains relatively common in secondary vegetation areas, though sensitive and no large mammal been reported in the area. Overall, the faunal assemblage in the gold rush area is now dominated by disturbance-tolerant and opportunistic species, reflecting the environmental stress imposed by intensive and unregulated mining activities.

4.6 WATER RESOURCES

This section describes the current state of water resources within the Nkonkilangi project area. It involved an assessment of water quality data provided by NEMC, and topography to determine flows and quantity providing an essential benchmark against which potential impacts of the proposed project can be evaluated. By establishing an understanding of the existing conditions, the baseline data not only informs effective mitigation strategies and management plans but also ensures regulatory compliance.

4.6.1 Hydrology and Surface Water Resources

4.6.1.1 Regional Hydrology

The study area falls within the boundaries of the Internal Drainage Basin (IDB). The basin is situated in the north-eastern part of the country. It is the second largest basin in Tanzania, which extends over 6 regions (Arusha, Shinyanga, Manyara, Dodoma, Singida, and Tabora) with a nominal area of 142,200 km² inside Tanzania. The annual precipitation in almost the whole IDB ranges from 600mm to 900mm with annual evapotranspiration rate of over 2,000mm and an average temperature range between 25°C and 30°C during day time and falls between 15°C - 20°C in the night. The Internal drainage basin is subdivided into nine (09) subbasins as shown on Figure 4-8.

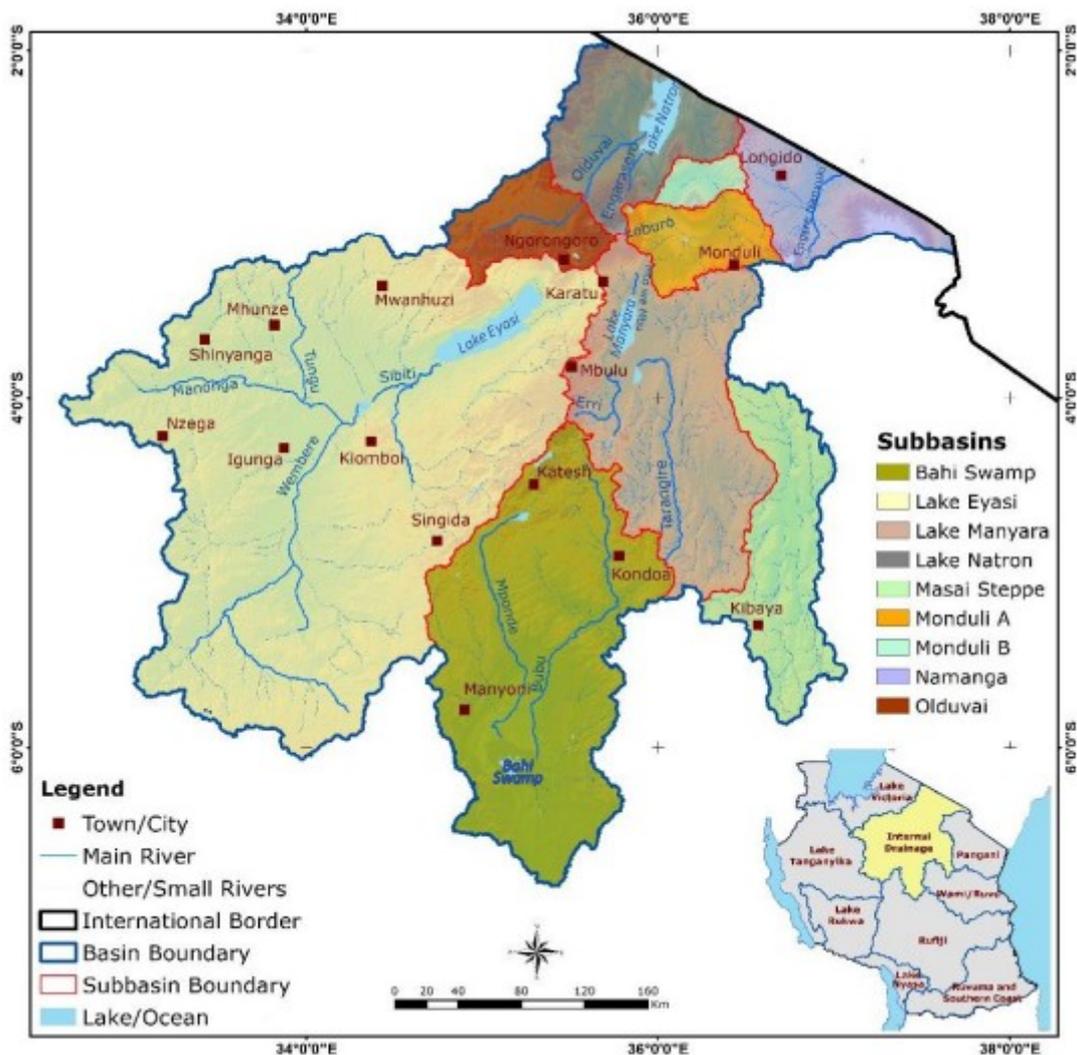


Figure 4-7: Internal Drainage Basin
Source (Tanzania Ministry of Water)

The specific area of study is located within the Lake Eyas subbasin. The notable hydrological feature in this subbasin is Lake Eyas which receives water from various major rivers, tributaries as well as other small rivers. The primary inflow, the Sibiti River, enters from the southwestern end and may exhibit a somewhat consistent flow throughout the year, particularly in wetter periods. Other inflows are seasonal. The second-largest contributor is the Baray in the northeast, with its water volume heightened in recent years due to deforestation in the Crater Highlands. The southwest slope of Mount Oldeani, a Ngorongoro volcano, directly feeds into the northeast part of the lake. Formerly the second largest, the Budahaya/Udahaya River, draining into the Yaeda Swamp southeast of the lake, has seen reduced flow due to water diversion in the Mbulu Highlands. The Serengeti contributes minimally, with the largest stream being the Sayu.

4.6.1.2 Nkonkilangi Area Drainage

Figure 4-9 illustrates the boundaries of the Nkonkilangi watershed, delineated utilizing ArcGIS software and a 30x30m resolution digital elevation model (DEM). The watershed comprises a network of seasonal small streams that converge into major streams, extending across the landscape towards the northwest. Ultimately, these streams contribute to the flow of the significant Wembere River which runs its course north and northwest into Lake Kitangiri. From Lake Kitangiri, River Sibiti originates and flows across the landscape of the Lake Eyas sub-basin, and subsequently, the river merges with Lake Eyas as its ultimate destination. This intricate hydrological system is pivotal in influencing the ecological dynamics and water management within the broader Internal drainage sub-basin.

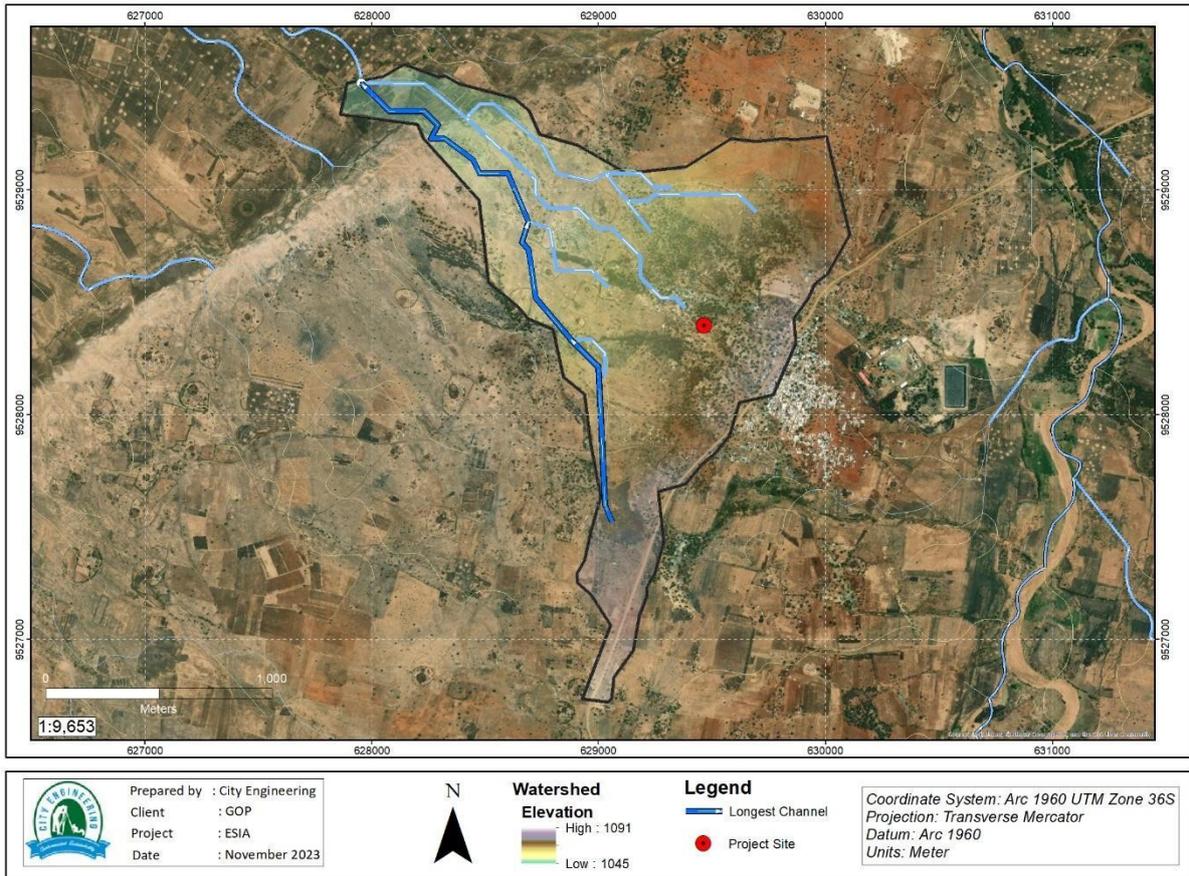


Figure 4-8: Watershed containing Nkonkilangi Project Area

Source (City Engineering Company Ltd)

Notable surface water sources identified in the vicinity of the area include small and large streams, predominantly seasonal, and small ponds formed during wet conditions observed during the site visit. According to local reports, these streams might flow into the Wembere River, a principal inflow of Lake Kitangire. Two significant streams, Mwajuma (Figure 4-10) and Kenkang'ombe as named by the locals consulted during the field visit.



Figure 4-9: A significant Seasonal stream (Mwajuma) at Nkonkilangi village

Source (City Engineering Company Ltd)

4.6.2 Groundwater

The miners reported that groundwater is abundant in their workings such that they need to constantly run dewatering pumps otherwise they are not able to access their underground workings. The water was just left to drain onto land following a natural gradient to the lowlands. This water is also used for mining purposes.

During the site visit, the locals consulted said there are two groundwater sources within the village. One, a dug well-constructed by locals which was cased using an old plastic drum and covered, serves as the principal freshwater supply for the village and nearby small-scale miners. This water source is utilized for various activities, ranging from domestic use to gold production. The second well, constructed by the SEMA project, produces saltwater and is used for limited applications mainly washing (bathing and clothes).

4.6.3 Water Quality

Water quality baseline conditions were established through in-situ measurements and laboratory analysis of selected heavy metals at representative locations within and around the project area. Sampling was conducted at Sekenke W7 (Coordinates: -4.265980°, 34.167156°),

representing water abstracted from an active mining pit/shaft, and Sekenke W7A (Coordinates: -4.263668°, 34.165567°), which is a ponded water body within an abandoned mined pit/shaft. Additionally, a seasonal stream located approximately 1.5 km from the project site (Coordinates: -4.259489°, 34.180306°) was assessed to represent a potential downstream receptor of runoff from the mining area.

Field measurements included pH, turbidity, Total Dissolved Solids (TDS), and temperature, providing an indication of the general physicochemical characteristics of the water bodies. The results indicate elevated levels of Total Dissolved Solids (3045 mg/l) and turbidity (586 NTU) compared to the permissible limits of 1200 mg/l and 30 NTU, respectively, as specified in TZS 860:2019. These elevated values are consistent with increased sediment load and dissolved materials associated with disturbed surfaces, erosion processes, and runoff within the mining environment.

Laboratory analysis focused on key heavy metals including mercury (Hg), arsenic (As), cadmium (Cd), lead (Pb), copper (Cu), and zinc (Zn). The results revealed that lead (Pb) exceeded the permissible limit, registering 0.01471 mg/l, slightly above the TZS 860:2019 limit of 0.01 mg/l, while all other analyzed metals were within prescribed limits. The elevated lead levels are associated primarily with mobilization from disturbed soils and mineralized rock due to mining activities, reflecting the influence of mining-related disturbances on water quality

Table 4.1 Water Quality Results for Sekenke W7, W7A and Seasonal Stream

S/N	Parameter	Units	W7 (Pit/Shaff Water)	W7A (Pond Water)	Seasonal Stream	TZS 860:2019 Limits
1	pH	-	6.83	7.18	7.85	6.5 – 8.5
2	Copper (Cu)	mg/l	<0.01	<0.01	<0.01	3.0
3	Lead (Pb)	mg/l	0.01471	0.01471	0.01471	0.01
4	Zinc (Zn)	mg/l	<0.01	<0.01	<0.01	5.0
5	Cadmium (Cd)	mg/l	<0.01	<0.01	<0.01	0.05
6	Chromium (Cr)	mg/l	<0.01	<0.01	<0.01	0.05
7	Nickel (Ni)	mg/l	<0.01	<0.01	<0.01	NM
8	Mercury (Hg)	mg/l	<0.01	<0.01	<0.01	0.01

4.7 AIR QUALITY

Air quality baseline conditions were established through systematic monitoring of key criteria pollutants at representative locations within and around a small-scale gold mining operation. Sampling was conducted to characterize the ambient air environment in an area influenced by artisanal mining activities, providing a benchmark against which future impacts can be assessed and potential occupational and community exposure risks evaluated.

Monitoring Point 1 (Coordinates: 4.266032° S, 34.166627° E) was established near active mining and mineral processing areas to capture emissions from potential sources such as excavation, ore crushing, and diesel-powered equipment.

Monitoring Point 2 (Coordinates: 4.265831° S, 34.167147° E) and **Monitoring Point 3** (Coordinates: 4.266065° S, 34.167140° E) were positioned to assess air quality in adjacent zones, including areas downwind of processing activities and near residential or communal spaces where miners and local communities may be exposed.

The monitored parameters included Carbon Monoxide (CO), Nitrogen Dioxide (NO₂), Ozone (O₃), Volatile Organic Compounds (VOC), Sulphur Dioxide (SO₂), and particulate matter (PM_{2.5} and PM₁₀). These pollutants are of particular concern in small-scale mining contexts due to the use of diesel generators, artisanal equipment, and potential biomass burning for site clearance or domestic use.

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

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

Location	Coordinates	CO (ppm)	NO₂ (ppm)	O₃ (ppm)	VOC (ppm)	SO₂ (ppm)	PM2.5 (ppm)	PM10 (ppm)
Monitoring Point 1	4.266032° S, 34.166627° E	0.5	0.02	0.03	0.10	0.00	0.012	0.025
Monitoring Point 2	4.265831° S, 34.167147° E	0.6	0.02	0.03	0.12	0.00	0.013	0.027
Monitoring Point 3	4.266065° S, 34.167140° E	0.5	0.03	0.04	0.11	0.00	0.012	0.026
Tanzania Standard [TZS 845:2007]		20	0.1	0.1	10	0.05	0.05-0.08	0.05-0.116
World Bank EHSs for air quality		10	0.2	0.1 (8hr)	NM	0.125	0.075	0.15

4.8 NOISE AND VIBRATION

Noise baseline conditions were established through in-situ measurements at representative locations within and around the small-scale gold mining operation. Monitoring was conducted to characterize the existing acoustic environment in areas influenced by artisanal mining activities, providing a benchmark against which future noise impacts can be assessed and potential community exposure evaluated.

Monitoring Point N1 (Coordinates: 4.266032° S, 34.166627° E) was established near active mining and mineral processing areas to capture noise emissions from excavation, ore crushing, and diesel-powered equipment operation.

Monitoring Point N2 (Coordinates: 4.265831° S, 34.167147° E) was positioned to assess noise levels in adjacent zones, including areas downwind of processing activities and near residential or communal spaces where miners and local communities may be exposed.

Noise measurements were taken using a sound level meter PCE 322A, and the levels recorded were as follows:

Table 4.3: **Summary of Baseline Noise Measurements at Monitoring Points**

Location	Coordinates	Noise Level (dBA)
Monitoring Point N1	4.266032° S, 34.166627° E	64
Monitoring Point N2	4.265831° S, 34.167147° E	74
Tanzania Standards [Environmental Management (Noise and Vibration Pollution) Regulations, 2015]		
Residential Areas (Daytime)		60
Residential Areas (Nighttime)		50

Location	Coordinates	Noise Level (dBA)
Mixed Residential & Small-Scale Commercial/Industrial		60

The noise levels recorded at both monitoring points (64 dBA and 74 dBA) were above the maximum permissible levels for the general environment as stipulated in the Environmental Management (Quality Standards for the Control of Noise and Vibration Pollution) Regulations, 2015. The standard for areas used for residential purposes and small-scale production and commerce is 60 dBA during daytime and 50 dBA during nighttime

4.9 SOCIO-ECONOMIC BASELINE

This chapter describes the existing socio-economic status of the study area including wards and villages that are likely to experience direct and indirect benefits/impacts associated with the proposed Project

4.9.1 Geographic Location and Administration

Singida Region is in the central part of Tanzania and has seven Local Government Authorities namely Singida Municipal Council, Singida District Council, Manyoni District Council, Mkalama District Council, Itigi District Council, Iramba District Council, and Ikungi District Council as shown in Figure 4-11 below. Nkonkilangi village is within Ntwike ward which is part of Iramba District Council.

Iramba District lies between Latitudes 4° to 4°.3° S and Longitudes 34° to 35° E. It borders with Meatu Districts which is part of the Simiyu Region to the North, the Mkalama District to the East, the Singida District to the South, and the Igunga District, part of the Tabora Region to the West. Iramba District Council is divided into 4 Divisions, 20 Wards, 70 Villages and 392 hamlets.

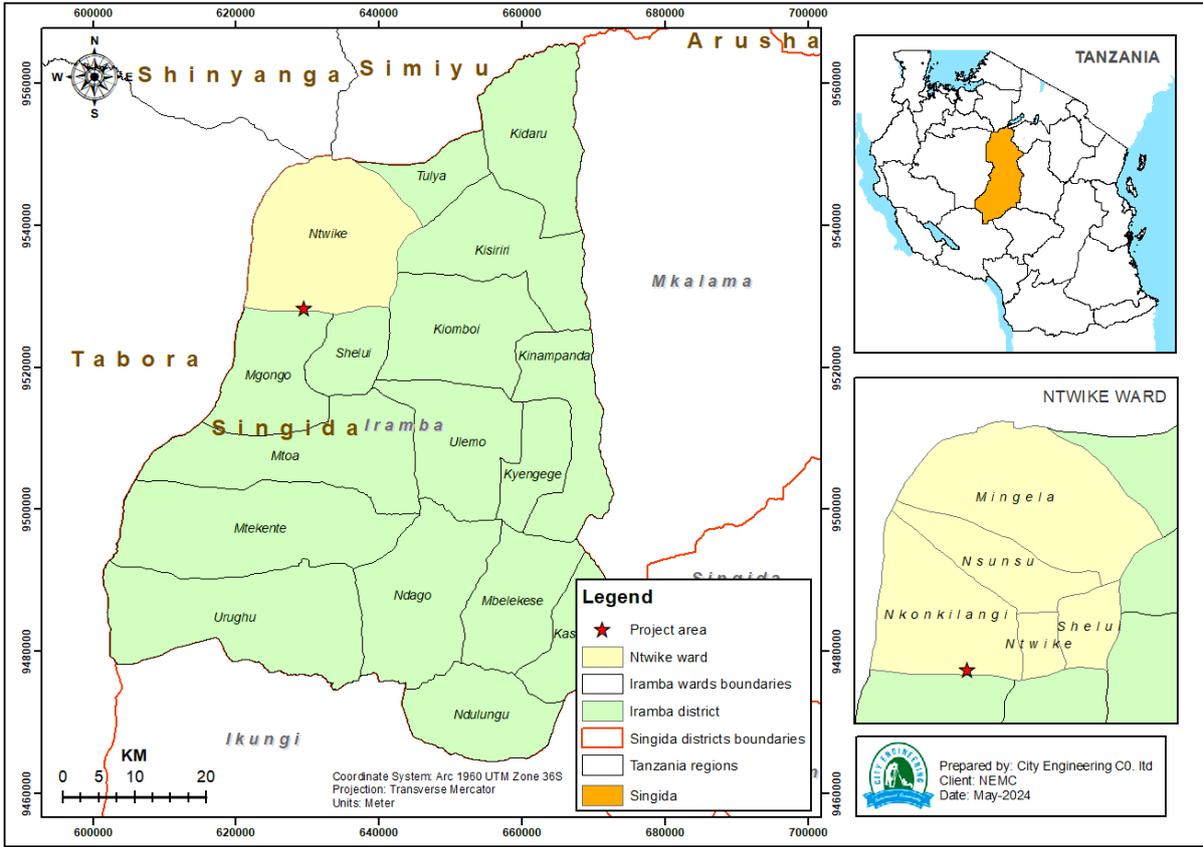


Figure 4-10: Administrative Map

4.9.2 Population

According to the 2022 National Population and Housing Census, Iramba DC had a population of 328,912 (Female 165,472 and Males 163,440) in 64,645 households. The average household size was 5.1 which was equivalent to the regional average also at 5.1.

Ntwike Ward has a total population of 24,629 people in 5,791 households with an average family size of 4.3 and a male-to-female ratio of 103.

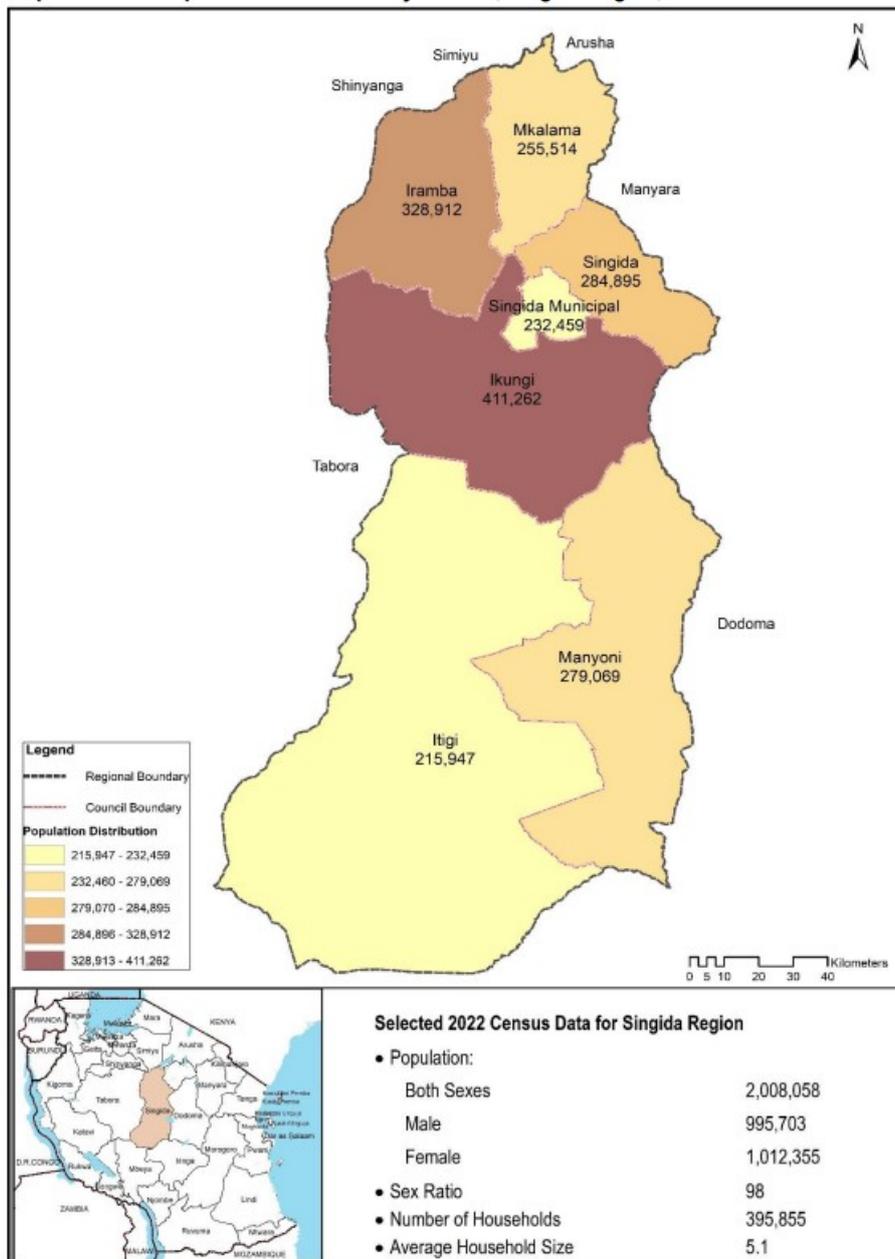


Figure 4-11: District Councils in Singida Region

(Source: NBS, 2023²)

4.9.3 Water Supply

The 2012 Population and Housing Census results state that the main source of drinking water in Iramba districts was surface water (river, dam, wells). About 35.6 percent of households used water from improved drinking water sources (piped water, public taps, boreholes, protected wells, and springs). About 64 percent of private households use non-improved drinking water

² [Administrative units Population Distribution Report Tanzania Mainland volume1b.pdf \(nbs.go.tz\)](https://nbs.go.tz/Administrative_units_Population_Distribution_Report_Tanzania_Mainland_volume1b.pdf)

sources. Source from Iramba district. In the Ntwike ward, there are five villages. Among these villages, three water wells were built with RUWASA in Nkokilangi, Msusu, and Ntwike villages. However, there is still a water challenge in the ward because some villages do not have access to clean and safe water

4.9.4 Health Facilities

Iramba District Council has a total of 48 dispensaries both privately and government-owned, in addition, there are 4 health centers and 1 district hospital. These facilities collectively provide essential health services to the community. Ntwike ward has 2 dispensaries and one of the dispensaries is Ntwike dispensary which is located around 4km from the Nkokilangi village which the community at the village stated that this is the facility they use. This dispensary serves three villages. However, it faces several challenges including a shortage of medical staff, lack of blood transfusion services and x-ray equipment. In many cases these challenges often lead to patients requiring urgent care being referred to the nearest health facility which is Kiomboi District Hospital.

4.9.5 Education and Literacy

The engaged Ntwike ward leaders reported that most of the residents are literate. The ward has 6 Primary schools, named Sekenke Primary School, Ntwike Primary School, Mapinduzi Primary School, Walla Primary School, Issu Primary School, Milambo Primary School (See Table 4-1 for 2023 enrollments) and 1 Secondary school named Ntwike Secondary School which has 210 boys students and 228 girls who are enrolled at the school, Sekenke one mining offered 100 desks to the school. Ntwike sec school is faced with the challenge of continuous attendance and dropouts due to the distance many students have to travel to get to school. Some students walk between 8 to 12 kilometers to attend school. The Sekenke One Mining Company constructed a dormitory capable of accommodating 112 students to facilitate boarding, but it faces a shortfall of 56 double-decker beds and 112 mattresses.

Table 4-2: Students Enrolled in Primary Schools in Ntwike Ward for year 2023

Name of the School	Boys	Girls	Total
Walla Primary School	334	347	681
Mapinduzi Primary School	237	270	507
Ntwike Primary School	321	335	656
Issui Primary School	414	413	827
Sekenke Primary School	385	454	839

Name of the School	Boys	Girls	Total
Milambo Primary School	140	188	328

Source: City Engineering Co. Ltd field visit Nov 2023

4.9.6 Energy

In Iramba District the main source of energy for cooking for most of the private households was firewood (89.2 percent) followed by charcoal (9.4 percent), paraffin (0.6 percent), and wood (farm residual) 0.3 percent. The use of modern sources of energy is electricity (0.2 percent), solar energy, and gas (industrial) 0.1 percent each.

In the Ntwike ward, most people in the village area depend on forest resources for their livelihoods, predominantly through the use of firewood and charcoal. The local community depends on the area for access to pastures, firewood, and charcoal. In Nkokilangi village the challenge lies in the irregular availability and low voltage of national grid electricity, especially for small-scale miners at Sekenke one. They have expressed concerns that power cuts seriously hinder production as they are not able to run the big mine dewatering pumps hence making the shafts inaccessible due to being filled with water. Several large diesel generators (Figure 4-12) were observed in the various shafts and the representative said they have even a 1MVA generator installed at the old German mine shaft.



Figure 4-12: 500KVA Generators available at some of the mining operators at Sekenke One

4.9.7 Telecommunication

In Nkonkilangi village cellular network coverage includes Vodacom, Tigo, Airtel, and Halotel for both voice, messaging, and low bandwidth data. Information is also accessible through TV

and radio. While many residents lack TVs in their homes, they can access them through TV halls in the village center.

4.9.8 Infrastructure and Transport System

Iramba district It is accessible from Singida District, Mkalama, and Igunga through the main Singida – Mwanza tarmac highway and accessible from Meatu through feeder all-weather gravel roads. The project site at Nkonkilangi can be accessed by an all-weather gravel road branching off the main highway at Shelui Center which is about 20 km.

4.9.9 Environment Conservation and Management

To increase focus on environmental conservation, the Environment Department at LGAs has been split into two, Natural Resources and Environment Conservation, and Solid Waste Management and Cleaning. The Natural Resources and Environmental Conservation Department focuses on conservation efforts mainly tree planting. In the case of Nkonkilangi there is no specific conservation plan however mature acacia trees were observed to be left standing in various areas not required by human activities which in part contributes to natural regeneration.

4.9.10 Waste Management and Sanitation

At Nkonkilangi village and the project area there are no waste collection services and people depend on waste pits within their backyards or haphazardly on land as observed at Sekenke One Mining area as included in Figure 4-13.



Figure 4-13: Plastic waste haphazardly disposed at Sekenke One Mining Area

For liquid waste mainly excreta onsite systems consisting of pit latrines are used and once full they are traditionally emptied by digging a pit beside it. It was reported that due to health education campaigns done by the community leaders, most residents have excreta disposal facilities. Sullage from dishwashing, cleaning, and bathing are mainly directed to the environment outside the homestead.

4.9.11 Housing and Ownership

The majority of houses in Nkonkilangi village are in fair condition, built with burnt or mud bricks, and topped with iron sheet roofing or thatch. Many guest houses are full suit iron sheet walls, roofing doors and windows. Upon inquiry the team was informed that these are common temporal housing which are constructed on land which is in most cases rented and this temporary structure erected to provide accommodation for the migrant miners. As these are gold rush areas, it is anticipated that eventually when the gold deposits are depleted these communities will leave and gold to the next famous gold rush area. The iron sheets can easily be dismantled and taken to the next site.

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

4.9.12 Gender Issues, Social Relations, and Welfare of Children

Tanzania has made significant efforts and investments in advancing and empowering women to achieve gender balance and address gender-based violence (GBV) and violence against children (VAC). In the project area, gender-based violence mentioned included spouse/lovers' conflicts.

4.9.13 Ethnicity and Cultural Heritage

The most dominant ethnic groups in Iramba are Nyeramba, Nyaturu which are native to Singida and other migrant tribes such as the Iraq tribe, Chagga, and gogo whom have come for business opportunities. No areas of cultural significance were mentioned during the engagement with stakeholders.

4.9.14 Financial Services

Iramba districts have different financial institutions, including CRDB, NMB, and Azania banks, primarily located in the district center at Kiomboi. However, in Nkokilangi village, there are no financial institutions. Instead, mobile money services such as Tigo-Pesa, Airtel Money, M-Pesa, T-Pesa, and Halopesa play a significant role in financial transactions. Notably, the community at Iramba District Council reported that small-scale miners, particularly youth, have the

privilege of requesting loans of any amount from a fund allocated by the district through the District Community Development Department which is sourced from the Prime Minister's office.

4.9.15 Economic Activities

Nkokilangi residents are engaging in diverse economic activities for their livelihoods apart from Mining in which women are also actively involved mainly for crushing and panning. The other activities included subsistence agriculture not only for food but also cash crops like sunflower and cotton; free-range livestock keeping; fishing and petty trading.

4.10 PROJECT AREA

It is important to define the spatial, administrative, legislative, and technical scope of the scoping study to ensure that the approach and methodologies applied are appropriate to meet the objectives of the study.

4.10.1 Spatial boundaries

The spatial boundaries of the project will cover the project core sites (Sambaru, Ikungi District and Nkonkilangi, Iramba District of Singida region; and Mwime and Mwabomba areas, Kahama District of Shinyanga Region;) and about 100m radius. Environmental resources (Climate, topography, geology, soils, seismicity, air, water, flora, and fauna) will be in accordance with the floristic, habitat/ecological, catchment area, sub-basin, basin, and zonal/regional boundaries; Social boundaries will follow the administrative framework from village, ward, district and regional levels.

4.10.2 Legislative scope

The legislative scope is based on the key legislation and standards governing mining, environment, labor, and the respective natural resources plus the documents developed by the project to comply with the WB ESS Standards i.e. the project ESMF and ESCP. At a minimum, the policies, legislation, standards, and guidelines that will govern this scoping study include:

- The Mining Act (2010 as revised in 2019) and subsidiary regulations on Occupational Health, Safety and Environmental Protection (2010)
- The Environmental Management Act No. 20 (2004) and subsidiary regulations on Environmental Impact Assessment and Audit Regulations (2005 as revised in 2018), Environment Quality Standards (2007, 2015), Environment Management – Solid and Hazardous Waste Regulations
- The Occupational Health and Safety Act No. 5 of 2003 and subsidiary regulations.
- The Employment and Labor Relations Act of 2004 and subsidiary rules

- The Industrial and Consumer Chemicals (Management and Control) Act of 2003 and subsidiary regulations of 2020
- WB General EHS and Mining Guidelines
- WB ESS Standards that have been identified as relevant to the project as included in section 2.2.2; the project Environmental and Social Commitment Plan (ESCP); Stakeholder Engagement Plan (SEP); and Labor Management Plan (LMP)

4.10.3 Temporal Boundaries

The scoping exercise has identified that the project will be divided into distinct phases, namely the design and planning phase, construction phase, operation and maintenance phase, and decommissioning phase.

4.10.4 Institutional Boundaries

Institutional boundaries in this context pertain to the institutions and sectoral boundaries within which the project is situated or mandated. The project involves the facilities for processing and washing gold ore. The relevant institutions and administrative units of interest in Tanzania are listed below

Institutions (Regulatory and Service Organizations)

- Ministry of Water
- Zonal NEMC Office – Lake Zone
- Inland Basin Water Board
- Government Chemistry Laboratory Agency (GCLA)
- Fire and Rescue Offices
- Occupational Safety and Health Authority (OSHA) Central Zone

Administrative Units

- Mining Commissioner
- Regional Commissioner
- Singida Regional Office
- Iramba Municipal Council
- Resident Mines Officer (RMO) Office
- Ntwike Ward
- Nkonkilangi Village Council
- Sekenke One Mining Co. Society Ltd Site (Private Mining Company)

5 CHAPTER FIVE: PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

5.1 INTRODUCTION

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

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

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

5.2 OBJECTIVES OF STAKEHOLDER CONSULTATION

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

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

- Provide accessible means for project-affected parties to raise issues and grievances, and respond to them promptly and fairly

5.3 LEGISLATION REQUIREMENT

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

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

5.4 STAKEHOLDERS CONSULTATION PROCESS

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

5.4.1 Stakeholder Engagement Plan

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

5.4.2 Stakeholders Identification and Analysis

Stakeholder identification focuses on prioritizing the interests of those affected and interest by the project and evaluating their concerns and areas of interest based on the project's administrative or regulatory jurisdiction. This analysis helps establish the project's scope of influence and determines who should be involved in the consultation for the scoping study. The consultant identified various organizations, groups, and individuals as stakeholders based on their roles and relevance to the proposed construction of the gold ores washing facilities

project. An approach for systematically identifying stakeholder groups was guided by the following:

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

The stakeholder analysis was used to group stakeholders according to their influence and support concerning the Project such as government authorities at different levels (Regional, District, Ward, Village). The table below provides a detailed list of stakeholders' engagement at each level in the table below

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

Stakeholders Group	Stakeholders	Relevance to the Project
Regulators/Government Agencies/Institutions	Government Chemist Laboratory Agency (GCLA), Mwanza, Lake Tanganyika Basin Water Office, Inland Drainage Basin Water Office, Fire and Rescue Services	The Authority deals with permits related to chemical handling, management, and usage; water resources management and pollution prevention; emergency services

Stakeholders Group	Stakeholders	Relevance to the Project
Regional Administration	Singida Regional Management Team Regional Commissioner Regional Administrative Secretary -RAS Regional Medical Officer-RMO Resident Mine Officer -RMO (mines) Regional Fire Officer-RFO Regional Police Commander -RPC TFS	In charge of regional community health and welfare, investment development, environment management, and security.
District Administration	Singida Region Iramba District; DED -District Executive Director District Management Team District Commissioner District Administrative Secretary Heads of Department -DCDO, DEMO, Social welfare, Planning, DMO	Responsible for people's welfare in the district and responsible for District development. They oversee the general community's welfare (in terms of People's rights, environment, security, welfare, etc).
Ward Administration	Singida district Ntwike ward; Ward Councillor Ward Development Committee Ward Executive Officers Ward Development committee	Responsible for Ward administration, community development, social welfare, environment, and land management.
Village Administration	Nkonkilangi village; Village Councils (VC) Village Environment Committees	Responsible for people's welfare in the Village and responsible for Village development. They oversee the general community's welfare (in terms of People's rights, environment, security, welfare, etc).
Institutions	The local existing community institutions such as schools, police churches, mosques, hospitals, CBOs, and NGOs,	Responsible for the provision of social services (health, education, safety, security, worshipping, and education but

Stakeholders Group	Stakeholders	Relevance to the Project
		could also take part in observing the environment.
Community	Community members at Nkonkilangi Singida district, religious leaders, traditional leaders, Influential	These are communities in proximity to the Project area and are responsible for providing necessary inputs during Project planning and will be potentially impacted by the mining activities
Individuals/ groups	PML and Surface Rights Owners, Groups Managing the PMLs	Community members located in the Project area and may directly be impacted by the Project, in terms of relinquishing their surface rights for the project and have a potential to be either economic/physically displacement.

5.4.3 Methodology of Consultation

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

5.4.3.1 Notification of Stakeholders

To align with the requirements of the ESSs, stakeholders should be notified as early as possible so they can understand the agenda that is going to be discussed and can make it to the meeting venue. The consultation was initiated by sending advance information through phone calls to make appointments with all the stakeholders including the Regional Administrative offices of the Singida Region and Singida District, as well as to ward and village leaders at least a week before the engagement. The phone call not only detailed the program but also requested the aforementioned government leaders to inform their respective committees and community members/villagers about the program and ensure their

attendance at the consultation meetings with the consultants. The meeting venue was agreed upon by the target groups and the team followed the stakeholders to their places of work e.g. mining area, cooperatives offices, village and ward offices, schools, etc

The consultation process was facilitated by the sociologist and the meetings took place from 11th November to 17th November 2023.

5.4.3.2 One-to-one meetings

A meeting took place between the consultant and key officials such as the government Chemist Laboratory Agency (GCLA), Inland Drainage Basin Water Office, Fire and Rescue Services and Singida Regional Management Team, Singida Region and Iramba Districts as follows

- **Regional Level**

A meeting was held on 11th, 2023, at the Singida regional office to present information on the scoping process and to obtain the Regional administrative leader's opinions about the project. The RC was also informed about the meetings that are to be conducted at the local level with a similar agenda of which the input and concerns provided by the official were duly noted and incorporated into this report

- **District Level**

The meetings were held with the District Commissioner Office (DC, District Executive Directors (DED), and Heads of Departments of Iramba on November 16, 2023. The scoping study faced a challenge, especially at Iramba due to the Regional Commissioner's visiting projects in the district, resulting in the majority of the district leaders being unavailable. As a workaround, the study proceeded with the Assistant DED and Assistant Heads of Departments. The discussion included an overview of the project and the scoping process. Comments and concerns were raised and included in the scoping

- **Government Agencies**

Meetings were held with the representatives from the Government Agencies between the 6th, 7th, and 13th Nov 2023, the government agencies involved in the scoping consultation process included the Government Chemist Laboratory Agency (GCLA), TFS, and Inland Drainage Basin Water Office These agencies were consulted for the oversight of soliciting views and significant concerns on policy and regulatory responsibilities of the agencies concerning the Project. Comments from agencies have been the key to ensuring that Project activities conform to legislative requirements and procedures.

5.4.3.3 Focus Group Discussions

The Focus group discussions with the Ntwike ward leaders as well as the ward development committee, Police were conducted as follows;

- **Ward Level and Village Level**

Focus Group Discussions (FGDs) with the Ward Councilor, Ward Executive Officer, and Ward Development Committee (WDC) about the scoping were conducted on 15th November 2023 at Ntwike in Nkonkilangi village office and another FGD with Village Executive Officers (VEOs), Village Chairpersons, Village Council, Influential, Religious leaders, and traditional leaders. The primary objectives of these meetings were to provide information about the proposed project, explain the scoping process, and gather data on socio-economic baseline information in the local study area, encompassing aspects such as health, education, and livelihood activities



Figure 5-1: A FGDs with ward development committee on Ntwike ward at Nkonkilangi village office

(Source: CECL Field Study Nov 2023)

5.4.4 Stakeholders' Comments and Concerns

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

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

STAKEHOLDER	DATE	PLACE	ISSUE/CONCERN	COMMENT/RECOMMENDATION
<p>GCLA-Mwanza Chemist Mr, Boazi Muzari</p>	<p>13/11/2023</p>	<p>GCLA Office</p>	<p>It would be beneficial for NEMC to consider expanding the project's coverage. The initiative should target a larger number of small miners, as, at present, mercury has become similar to an illegal product due to its harmful effects on miners and communities. In the past, there was a well-known mercury distributor in Geita who received proper training on the safe transportation and sale of mercury. However, the situation has now changed, posing greater risks as miners have started to hide when they purchased</p>	<p>This will be the plan for the NEMC since this construction of gold ores and washing facilities under the component of EHMP</p>
<p>Regional Administrative Secretary-RAS Dr,Fatuma Mgaga RAS-Singida region</p>	<p>13/11/2023</p>	<p>RAS Office</p>	<ul style="list-style-type: none"> ● NEMC should start a program to provide incentive packages to those who provide information about small miners using mercury without following safety procedures ● NEMC needs to consider providing education in the community from one generation to the next about the effect of mercury ● NEMC must start the project since they will show the advanced equipment which will minimize the risk of using mercury. ● NEMC should also consider providing more training to small miners and implementing a system to capture new 	

STAKEHOLDER	DATE	PLACE	ISSUE/CONCERN	COMMENT/RECOMMENDATION
			small miners or an enrollment system. This way, everyone can receive an education, and it will be easier to understand who does not get an education due to mobility	
Regional Medical Officer (RMO) Singida Dr, Viccorina Ludovick	13/11/2023	RMO Office	<ul style="list-style-type: none"> It will support the small miners to understand the best and safety mechanism of handling mercury and other best practice methods NEMC should create of awareness to the community leaders so that they can provide full support during the implementation of the project 	N/A
Regional Police Commander - Singida RPC Office ACP, PS Kayumba	13/11/2023	RPS Office	NEMC should start implementing the project since there is it will support the small miners to understand the necessary measures to take in their work	N/A
Regional Fire Officer singida SR Devotha Bigawa (RFO)	13 th Nov 2023	RFO Office	<ul style="list-style-type: none"> NEMCs should consider sharing the structure layout to the Fire officer for advice before they start the construction NEMC needs to consider providing education to the ASGM and the community about safety 	The collaboration started and this ESIA survey is also meant to provide stakeholders with sufficient opportunity to engage and provide input and

STAKEHOLDER	DATE	PLACE	ISSUE/CONCERN	COMMENT/RECOMMENDATION
			<ul style="list-style-type: none"> As the NEMC project focuses on small-scale miners and communities, it would be beneficial for NEMC to collaborate with the regional fire department to provide additional education on how miners can address workplace emergencies and adhere to safety regulations 	suggestions on the proposed Project;
BWD-Singida Mr, Danford Samson Eng Mwandu Onesmo Head of Water lab	13th Nov 2023	BWD Office	NEMC should continue to collaborate with the water basin office, especially now that it has modern equipment for measuring water quality and its constituents. This will make it easier for the office to provide advice, particularly in mining areas with water-filled pits	Noted
Iramba District District Commission Mr, Suleman Y.Mwenda	14/11/2023	DC Office	While the NEMC project will be beneficial, the project needs to start considering alternative methods to mercury and provide additional education to small-scale miners.	Firstly, NEMC will construct gold ores and washing facilities to strengthen the institution's capacity to manage and regulate mercury use in Tanzania to small-scale gold miners
Iramba District Ag District Administrative system Mr, Oswarld Leopard	14/11/2023	DED Office	NEMC should start implementing the project since will address most of the challenges of the small miners, and the others will adopt	Noted

STAKEHOLDER	DATE	PLACE	ISSUE/CONCERN	COMMENT/RECOMMENDATION
Iramba District District Environment Management Officer- DEMO Mr, Jeremiah Kahurananga	14/11/2023	DEMO	<ul style="list-style-type: none"> ● NEMC should establish effective procedures for other miners beyond the project's center to learn from and adopt. ● NEMC should develop local expertise to ensure the project's sustainability after completion. ● NEMC should also assist the mining office in monitoring the importation of mercury into the country and its use by small-scale miners. ● NEMC should involve all safety and security committees, starting at the regional level, to ensure a common understanding and cooperation in project implementation 	Noted All the stakeholders from the regional level were engaged in scoping study
Ag DCDO-Iramba district Mr, Omary M.Lanjui	14/11/2023	DCDO Office	the National Environmental Management Council (NEMC) should collaborate with districts and stakeholders involved in HIV/AIDS projects when initiating a project. This collaboration will help provide additional education to small-scale miners and communities regarding sexually transmitted infections and HIV/AIDS transmission	N/A
DMO Iramba district Dr, Husein Sepoigo	14/11/2023	DMO Office	The project will support miners in taking care of their health. NEMC should collaborate closely with the health department	N/A

STAKEHOLDER	DATE	PLACE	ISSUE/CONCERN	COMMENT/RECOMMENDATION
			to provide additional education to miners regarding issues such as HIV/AIDS and sexually transmitted diseases	
Sekenke One Mining Cooperation Society Mr. Laurent Martin	15/11/2023	Sekenke One Mining Cooperation Society Office	The Sekenke One Mining Cooperative Society is ready to release its Primary Mining Licenses to be used for the construction of the plant; the project will be very good as it will serve as an example. However, they are facing some challenges that they would like NEMC to help in solving them i.e., water in the mining shaft whereby, they use pumps to remove water from the pits, and there is also a Chinese company in the initial stages of negotiating a contract to assist them in water management in the pits. Another issue is the challenge of electricity; the costs of electricity in the mines are very high, and frequent power outages pose a significant challenge to mining, especially in pits with water that require pumping. Without electricity, they cannot pump water, leading to significant losses.	N/A
Village Council, WDC, and Influential, religious leaders, and traditional leaders Nkonkilangi village	15/11/2023	VEO Office	<ul style="list-style-type: none"> The National Environmental Management Council (NEMC) inspect and grant permits to the small miners through a systematic process. NEMC needs to self-evaluate. 	N/A

STAKEHOLDER	DATE	PLACE	ISSUE/CONCERN	COMMENT/RECOMMENDATION
			<ul style="list-style-type: none"> • NEMC must assess the effective implementation and sustainability of the project after its completion. They should also involve key stakeholders, for instance, in planning the location and how they obtain the Sekenke One Mining Co. Society Ltd area. If they had involved the village government, the Village office could have allocated a large area for all miners to benefit and learn from the project, showing the importance of collaboration in decision-making • NEMC should start this project since the small miners engage in mineral processing without regard for their health and safety. Consequently, the project holds immense potential to benefit not only the miners but also the broader community. • NEMC should have various centers to make it convenient for stakeholders when they need services at their office, and there is a need for additional training for small-scale miners and the community. Currently, NEMC is responsible for collecting fees and providing control numbers 	
Lucas J Mkwama	15/11/2023	WEO Office	NEMC should start this project as soon as possible since the small miners at Samburu have been waiting for a long time	N/A

STAKEHOLDER	DATE	PLACE	ISSUE/CONCERN	COMMENT/RECOMMENDATION
(Ward Executive Office - Ntwike)				

5.4.5 Reporting and Information Disclosure to Stakeholders

Disclosure and reporting of project information are vital for affected individuals and other stakeholders to understand the risks, impacts, and opportunities linked with the project and are undertaken as part of an ongoing process within stakeholder engagement. Thus, Information disclosure will occur at different stages of the study process. For instance, during the initial site visit, during the site selection and detailed scoping phases, relevant information will be provided to affected individuals. Further disclosure will occur when the scoping report is submitted to NEMC, and copies are sent to various stakeholders for their comments. This allows stakeholders to provide feedback and ensure their perspectives are considered. Subsequent disclosure will take place when the report is finalized and submitted to the Vice President's Office (VPO) for approval. At this point, the final report will be shared with various stakeholders, including the Regional Commissioner, Regional Mine Officer, District Council, Inland Basin Water Board and other relevant administrative institutions, providing them with information and understanding of the issues addressed in the report. Executive summary reports in Kiswahili and English will be prepared and included in the copies to help stakeholders understand the report's contents and mitigation measures and EMP. Furthermore, the report will be accessible through the NEMC online system (eia.nemc.or.tz).

5.4.6 Grievance Mechanism

In Nkokilangi village there have been complaints about the district-level leaders not providing opportunities for community involvement in village projects or decision-making. Often, grievances are directed toward leaders, and the subsequent transfer to the district level tends to result in prolonged resolution times.

Sekenke One Mining Co. Society Ltd Site will set up a grievance mechanism for the affected community to express their concerns, ensuring it is easily accessible and well-communicated once the project is underway. This mechanism will involve management at the relevant level and promptly address concerns through a transparent process that provides feedback to individuals involved without fear of retaliation. It will not obstruct access to other legal or administrative remedies available under the law or existing settlement procedures, nor will it substitute grievance mechanisms outlined in collective agreements.

6 CHAPTER SIX: ASSESSMENT OF IMPACT AND IDENTIFICATION OF ALTERNATIVES

The Environmental and Social (E&S) and screening processes have been followed by the project through the site selection process. The key potential environmental and social issues remaining after the comprehensive site screening process are related to:

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

These were observed at the operational processing facilities available at all the sites as the model plant will have similar facilities as narrated in Section 2.3 the main envisaged impacts are due to releases to air, land, and water, and impacts to people involved in mining/processing and other land users

6.1 IDENTIFIED IMPACTS

The Impacts Identified at the construction and operations phases are included in **Table 6-2** and **Table 6-3**. These relate to the risks identified in the ESMP. However, as similar activities are undertaken within the vicinity of the project sites the risk level determination is based on the prevailing environmental conditions, and hence for most the impacts are low.

6.1.1 Generation of Undesirable Levels of Noise to workers

The operation of the crusher and generators powering the crushers and dewatering pumps significantly contribute to the levels of noise. As observed when noise measurements were undertaken at Sekenke N13 and Sekenke N14, the baseline noise levels are already above the limit for areas with mixed residential, commercial, and production activities. However, as this is a gold rush area, these levels are not considered a nuisance to the residents, and they are pleased that activities are ongoing providing them with a source of livelihood and income. The impact due to noise from the operation of the plant is high as the probability is almost certain, the magnitude is high, and the consequences of hearing impairment are permanent.

6.1.2 Employee Health, Safety and Welfare

There are several HSE risks associated with the project employees

- i. **Site risks** – potential for injuries due to falling into the abandoned mine pits, sluicing drainage, and abandoned toilet pits;
- ii. **Inherent risks associated with construction activities** of potential for injuries due to working at height, manual handling; contact with sharp, heavy, and moving objects; slip and trip due to uneven ground and various items placed onsite, dust and noxious gas emissions; increased levels of noise; using shared sanitary facilities; sexual interactions amongst workers and the community;
- iii. **Inherent risks associated with ore processing** include noise, dust, contact with hazardous extraction chemicals (mercury, cyanide, lime)
- iv. **Welfare risks** include unfair employment conditions including payment below minimum wage, excessive working hours, discrimination, and harassment
- v. **Increased Road Safety Hazards T**

The rapid influx of people, equipment, and materials into the gold rush area combined with the informal and often unregulated nature of artisanal and small-scale mining (ASMG) operations—leads to intensified road traffic and unsafe transportation practices. Heavy vehicles transporting ore, fuel, and supplies frequently share narrow, unpaved roads with pedestrians, motorbikes, and livestock. This situation increases the likelihood of road accidents, dust-related visibility problems, and vehicle-community conflicts

6.1.3 Community Health and Safety Risks

6.1.3.1 Mercury Poisoning and Toxic Exposure to nearby community and workers

Mercury is widely used in artisanal gold extraction for amalgamation due to its low cost and ease of application. However, miners typically handle it without gloves or masks, often mixing mercury directly with ore by hand. During amalgam burning, mercury vapours are released into the air and inhaled by miners and nearby residents. Acute exposure can cause headaches, tremors, nausea, skin rashes, and respiratory distress, while chronic exposure leads to severe neurological and renal disorders, including loss of coordination, cognitive decline, and memory impairment. Pregnant women and children are especially at risk, as mercury can cross the placenta and impair foetal brain development, resulting in lifelong learning disabilities and developmental delays.

6.1.3.2 Contamination of Water Sources and Food Chain

Improper disposal of mercury-contaminated tailings and effluents leads to contamination of nearby rivers, wetlands, and groundwater. In aquatic environments, mercury is converted by microbial action into methylmercury, a highly toxic compound that accumulates in fish and aquatic organisms. Communities that depend on these water sources for drinking, bathing,

irrigation, and fishing are chronically exposed through the food chain. Over time, methylmercury bioaccumulates in human tissues, particularly affecting the nervous system and posing serious health risks such as visual impairment, speech difficulties, and loss of motor control. This contamination also undermines local food security and livelihoods.

6.1.3.3 Air Pollution from Mercury Vapour

When mercury–gold amalgam is heated in open pans during gold recovery, mercury vapour is released into the atmosphere and inhaled by miners and nearby communities. This vapour settles on soils, vegetation, and water surfaces, creating persistent environmental contamination. Long-term inhalation exposure leads to chronic mercury poisoning, with symptoms including fatigue, insomnia, irritability, and irreversible neurological damage. Individuals working in enclosed or poorly ventilated processing areas are particularly vulnerable, as vapour concentrations can reach hazardous levels exceeding international occupational safety thresholds.

6.1.3.4 Gender-Based Violence and Social Conflicts

The influx of male labourers and lack of formal law enforcement increase the incidence of gender-based violence (GBV), including sexual harassment, exploitation, and intimate partner violence. The economic vulnerability of women in ASM communities often forces them into informal or risky employment, including sex work, which increases exposure to sexually transmitted infections (STIs), including HIV/AIDS. Disputes over mineral claims, access to resources, and competition among mining groups also result in frequent interpersonal and community conflicts, sometimes escalating to physical violence and insecurity in mining camps.

6.1.3.5 Dust and Noise Impacts

Crushing, grinding, and ore transportation generate significant quantities of dust, which contain silica and metal particles. Prolonged inhalation causes respiratory diseases such as silicosis, chronic bronchitis, and asthma. Continuous noise from crushers, hammer mills, and generators contributes to hearing impairment, fatigue, and stress-related disorders. Vibrations from manual drilling and mechanical equipment can also cause musculoskeletal pain and joint disorders, affecting miners' long-term physical health.

6.1.3.6 Unrestricted Access to the Facility

The open and uncontrolled nature of gold rush areas often attracts large numbers of miners, traders, and community members seeking opportunities. In such environments, lack of clear boundaries, fencing, or access control measures can result in unrestricted entry into operational zones. This poses serious safety, security, and environmental risks, including

accidents involving unauthorized persons, theft or vandalism of equipment, interference with mining operations, and potential conflicts between ASMG members and formal operations. Moreover, unrestricted access may increase exposure to occupational hazards such as dust, noise, or chemical contamination, further compromising community health and safety.

6.1.4 Impacts on Water Resources

Increased water demand for use in construction, by construction workers and operation of the proposed gold ores processing facility. The high demand for water in ore washing, panning, and processing often results in uncontrolled abstraction from rivers, streams, and groundwater sources. This excessive withdrawal can lower water tables, reduce surface flow, and cause competition and conflict between miners and local communities who depend on the same sources for domestic and agricultural use.

In addition to quantity concerns, the quality of water resources in gold rush areas is often compromised. The use of mercury and other processing chemicals—combined with the discharge of untreated effluents and sediment-laden runoff—pollutes nearby rivers. This contamination increases turbidity, introduces toxic elements, and poses serious health risks to humans and aquatic organisms. Over time, degraded water quality can render local sources unsafe for drinking, irrigation, or livestock, undermining both environmental integrity and community well-being.

6.1.5 Generation of Hazardous Waste

Construction wastes will contain cement, paints, and specific materials that contain hazards. The use of extraction chemicals e.g. Mercury, Cyanide and Lime will generate chemically contaminated waste from packaging/containers, tailings and wastewater.

6.1.6 Air Quality Impacts

The excavation, crushing, and grinding of ore release large quantities of dust and fine particulate matter into the atmosphere, particularly in dry and windy conditions. Continuous movement of vehicles on unpaved roads and open pit operations further aggravate dust emissions, reducing air quality and visibility. These conditions affect the health of miners and nearby residents, often causing respiratory problems, eye irritation, and other dust-related ailments.

In addition to dust, air quality deterioration in gold rush zones may also result from the release of toxic gases and fumes during ore processing and amalgamation. The use of mercury and other volatile substances in ASMG operations emits hazardous vapors that can contaminate both indoor and outdoor air. Open burning of waste materials, fuel combustion from generators, and increased settlement activities compound the problem by introducing smoke,

carbon monoxide, and hydrocarbons. Over time, these pollutants contribute to localized atmospheric degradation, posing long-term risks to human health and the surrounding environment.

6.1.7 Impacts on Soil

6.1.7.1 Soil Erosion

Project activities, particularly those driven by artisanal and small-scale mining (ASMG), often lead to extensive soil disturbance through excavation, vehicle movement and clearing of vegetation. The removal of topsoil and exposure of loose earth surfaces make the land highly susceptible to erosion by wind and rain. During heavy rainfall, eroded sediments are carried into nearby rivers and wetlands, leading to siltation and degradation of aquatic habitats. Over time, this process reduces soil fertility, destabilizes slopes, and hinders natural regeneration, leaving behind degraded and unproductive landscapes.

6.1.7.2 Soil contamination from project activities

Soil contamination is also a major concern in gold rush areas due to the uncontrolled use and improper disposal of hazardous substances such as mercury, and hydrocarbons from machinery. These pollutants can infiltrate the soil profile, reduce its biological productivity and pose risks to crops, livestock, and groundwater quality. Contaminated soils not only impair agricultural potential but also present long-term ecological and health hazards for surrounding communities and ecosystems.

6.2 IMPACT ASSESSMENT CRITERIA

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

Table 6-1: Risk Assessment Criteria

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

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

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

Phase/Activity	Potential Impact	Probability	Magnitude	Duration	Extent	Risk Level
Construction Phase						
Potential land clearance	Generation of dust nuisance to the neighbors at the adjacent guest house and shops/bars	Definite	Low	Medium term	Site specific	Low
	Generation of undesirable noise levels	Definite	Very low	Medium term	Site specific	Low
	Generation of demolition waste	Definite	Low	Short term	Local	Low
	Generation of sediments that may wash into waterways	Probable	Low	Medium term	Site specific	Low
	Occupational safety and health risks due to sharp and heavy objects in the demolition	Probable	Low	Medium term	Site specific	Low
	Risk of falling into the mine and toilet pits onsite	Probable	Low	Medium term	Site specific	Low
	Potential for accidents due to use of heavy equipment	Probable	Low	Medium term	Site specific	Low
	Potential for impact incidents due to use of hand and jack hammers	Probable	Low	Medium term	Site specific	Low
Rehabilitation of degraded land, landscaping and tree planting	Improved health and safety due to backfilling of mining pits and excavations and levelling the ground	Probable	Low	Medium term	Site specific	Low
	Exposure of loose soil that may wash into waterways and cause siltation	Probable	Low	Medium term	Site specific	Low
	Change in drainage patterns	Probable	Low	Medium term	Site specific	Low
	Improved biodiversity due to encouraging and planting vegetation	Probable	Low	Medium term	Site specific	Low
	Improved aesthetics	Probable	Low	Medium term	Site specific	Low
Transit of supplies and project personnel to and from site	Increased traffic that increases potential for accidents in the community especially for children	Probable	Low	Medium term	Site specific	Low
		Probable	Low	Medium term	Site specific	Low

Phase/Activity	Potential Impact	Probability	Magnitude	Duration	Extent	Risk Level
Provision of food to employees	Generation of food waste	Probable	Low	Medium term	Site specific	Low
Provision of drinking water	Potential for communicable diseases due to use of unsafe water supply	Probable	Low	Medium term	Site specific	Low
	Increased water demand	Probable	Low	Medium term	Site specific	Low
Employee hygiene	Potential for spread of communicable diseases due to use of unsanitary washrooms	Probable	Low	Medium term	Site specific	Low
Sourcing of Labor	Immigration of construction workers	Probable	Low	Medium term	Site specific	Low
	Unfair employment terms to local people	Probable	Low	Medium term	Site specific	Low
	Unfair employment terms to Women	Probable	Low	Medium term	Site specific	Low
	Potential for child Labor	Probable	Low	Medium term	Site specific	Low
Construction of the facility	Unrestricted access to construction site	Probable	Low	Medium term	Site specific	Low
	Vibration from construction equipment	Probable	Low	Medium term	Site specific	Low
	Dust from construction activities	Probable	Low	Medium term	Site specific	Low
	Pollutant gases from construction equipment	Probable	Low	Medium term	Site specific	Low
Demobilization of construction workers	Increase number of single women and child headed families due to abandoning families	Probable	Low	Medium term	Site specific	Low

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

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Operation Phase						
Drying of ore	Health and safety risks due to manual heavy lifting	Probable	Low	Medium term	Site specific	Low
	Generation of sediments that may wash into waterways	Probable	Low	Medium term	Site specific	Low
	Generation of undesirable levels of noise	Definite	Medium	Long term	Local	Moderate

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Crushing of ore using hand hammers	Generation of dust exposure to workers	Probable	Low	Medium term	Site specific	Low
	Increased potential for finger injuries due to the use of hand hammers	Probable	Medium	Medium term	Site specific	Low
	Exposure of children to mine hazards due to being at the mine site with mothers for care	Probable	Medium	Long term	Local	Moderate
Grinding/milling using crushers	Generation of undesirable levels of noise	Probable	Low	Medium term	Site specific	Low
	Generation of dust	Probable	Low	Medium term	Site specific	Low
	Generation of metal waste (steel balls and work crushers)	Probable	Low	Medium term	Site specific	Low
Supplying of power to the crushers	Generation of noise from the onsite generators	Probable	Low	Medium term	Site specific	Low
	Emission of noxious gases from generators	Probable	Low	Medium term	Site specific	Low
	Increased potential for hydrocarbon spills polluting land and water	Probable	Low	Medium term	Site specific	Low
	Potential for fire from power generators	Probable	Low	Medium term	Site specific	Low
Sluicing	Potential for inhalation of dust during handling of milled ore	Probable	Low	Medium term	Site specific	Low
	Increased water demand for sluicing	Probable	Low	Medium term	Site specific	Low
	Generation of sediment-loaded wastewater	Probable	Low	Medium term	Site specific	Low
	Generation of tailings	Probable	Low	Medium term	Site specific	Low
Amalgamation	Exposure of employees' elemental mercury by contact	Probable	Medium	Long term	Local	Moderate
	Generation of wastewater that contains mercury in the amalgam pool	Probable	Medium	Long term	Local	Moderate
	Generation of mercury-laden tailings	Probable	Medium	Long term	Local	Moderate
	Generation of gold that contains mercury as an impurity	Probable	Medium	Long term	Local	Moderate
	Promoting continued mercury production and trade	Probable	Medium	Long term	Local	Moderate

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Removal of mercury and impurities in gold amalgam via heating	Increased demand for charcoal and firewood	Probable	Low	Medium term	Site specific	Low
	The release of mercury in the air causes pollution	Highly Probable	Medium	Long term	Regional	High
	Exposure of employees to mercury aerosols	Highly Probable	Medium	Long term	Regional	High
	Generation of ashes that may contain mercury	Probable	Low	Medium term	Site specific	Low
	Generation of mercury-contaminated waste from utilizing retort	Probable	Low	Medium term	Site specific	Low
Provision of food to employees	Generation of food waste	Probable	Low	Medium term	Site specific	Low
	Consuming contaminated food (Mercury/dust) as most eat at their worksite	Probable	Low	Medium term	Site specific	Low
Provision of drinking water	Potential for communicable diseases due to the use of unsafe water supply	Probable	Low	Medium term	Site specific	Low
	Increased water demand	Probable	Low	Medium term	Site specific	Low
Employee hygiene	Potential for the spread of communicable diseases due to the use of unsanitary washrooms	Probable	Low	Medium term	Site specific	Low
Provision of Labor	Unfair employment terms to local people	Probable	Low	Medium-term	Site-specific	Low
	Unfair Employment Terms to Women	Probable	Low	Medium-term	Site-specific	Low
Operation of the facility	Unrestricted access to the facility	Probable	Low	Medium-term	Site-specific	Low
	Failure or lack of facility maintenance leading to pollution	Probable	Low	Medium-term	Site-specific	Low
	Vibration from crushing the ores	Probable	Low	Medium-term	Site-specific	Low
	Dust from grinding, and crushing of ore	Probable	Low	Medium-term	Site-specific	Low
	Mercury dust from amalgamation of gold	Probable	Low	Medium-term	Site-specific	Low
	Pollutant gases from generator and burning wastes	Probable	Low	Medium-term	Site-specific	Low

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

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
Decommission Phase						
Dismantling of mine and plant infrastructures and 'leveling	<ul style="list-style-type: none"> Deterioration in ambient air quality due to dust and particulate matter (PM10 and PM2.5) Increased noise and vibrations that may lead to nuances and damage to properties Deterioration of water quality affecting the use of groundwater and surface water as a natural resource 	Probable	Low	Medium- term	Site - Specific	Low
Generation and management of wastes		Probable	Low	Medium- term	Site - Specific	Low
Transportation of materials out of site	Accident and Injuries	Probable	Low	Medium- term	Site - Specific	Low
Site leveling and revegetation	Introduction of invasive species	Probable	Low	Medium- term	Site - Specific	Low
Decommissioning	Soil contamination from residual chemicals, hydrocarbons, and processing reagents	Probable	Low	Medium- term	Site - Specific	Low
	Water pollution from leakage or runoff of contaminated materials into nearby rivers, streams, or groundwater.	Probable	Low	Medium- term	Site - Specific	Low
	Improper waste disposal (e.g., tailings, construction debris, and scrap materials) leading to long-term environmental hazards.	Probable	Low	Medium- term	Site - Specific	Low

Activity	Potential Impact	Likelihood	Magnitude	Duration	Extent	Risk Level
	Loss of employment and income for workers and local service providers following closure.	Probable	Low	Medium- term	Site - Specific	Low
	In-migration or scavenging at the decommissioned site, leading to potential accidents or conflicts.	Probable	Low	Medium- term	Site - Specific	Low
	Reduced local economic activity affecting small businesses dependent on the facility.	Probable	Low	Medium- term	Site - Specific	Low

6.3 ALTERNATIVES ANALYSIS

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

6.3.1 No Project Alternative

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

As these options support continued health, safety, and environmental issues, they are not viable.

6.3.2 VAT leaching Directly after Milling

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

Impacts associated with this option include high investment and operation costs, use of hazardous chemicals (cyanide and lime), generation of chemical wastes from packaging and remnant tailings, and skilled labor force. However, it will eliminate the need for mercury and the associated amalgamation process and burning. This option was found to be viable

downstream of the mercury amalgamation process which will be needed to generate the necessary cash for ASGM to access the VAT leaching plants. However, reprocessing of mercury-contaminated tailings results in mercury/cyanide compounds that are more easily dispersed in waters and make mercury more bio-available. The ASGM at all sites admitted that they were reprocessing tailings from the amalgamation pool.

6.3.3 Direct Smelting

In this process, a small mass of high-grade concentrate is first produced (by milling, sluicing, and/or concentrating), then it is melted to separate the gold from other minerals. If working with sluice carpet concentrate, additional concentration beyond the stage at which mercury is applied is required before direct smelting can be applied. Direct smelting is an alternative processing pathway that does not use mercury. However, it is important to understand that it is not a direct replacement for mercury because it is not applied at the same stage of processing. Mercury is commonly applied to large masses of concentrate - for example, 20 kg coming from the carpets of a sluice - whereas direct smelting is performed on small masses of high-grade concentrate usually no larger than 100g³. The challenge in this method is in the production of high-grade concentration (More than 25%), which may be achieved by using several sluices or various methods of gravity concentration e.g. panning or mechanical separators, e.g. shaking table. As no mercury is used, this method is more environmentally friendly, however as it requires multiple efforts to produce the high-grade concentrate and by the common methods available of sluicing and panning is tedious, may cause gold losses in additional concentration steps, and is time and energy consuming. These factors make it less appealing to the ASGM and hence it was not considered further.

6.3.4 Use of retorts

Heating to vaporize off mercury from the gold mercury amalgam obtained from panning (reported to contain 40 – 60% Mercury⁴) is another way workers and their families are exposed to mercury which subsequently reaches the environment. To remove this pathway use of retorts has been prescribed in the Mining (Environmental Protection for Small Scale Miners) Regulations of 2010 in separating gold from the amalgam. Retorts heat amalgam in one part and cool and condense the mercury vapour back into a liquid in another part of the device which can then be re-used after activation. Care should be taken when handling retorts as

³ [AGC Practical-Guide-on-Reducing-Mercury-in-ASGM_en.pdf \(artisanalgold.org\)](#)

⁴ [\(PDF\) Situational Analysis of Gold Processing Practices at Artisanal and Small-Scale Gold Mining in Tanzania \(researchgate.net\)](#)

they are contaminated with mercury and one should wait until they have completely cooled so as not to cause secondary mercury vapours release. Retorts are not commonly used in Artisanal and Small-Scale Gold Mining (ASGM) due to several reasons. One of the main reasons is that retorts require a certain level of technical expertise to operate and maintain, which may not be available to many ASGM miners. Additionally, retorts can be expensive to purchase and may not be affordable for many ASGM miners⁵. The impacts associated with the use of retorts are that themselves and the associated sand/water is that they can provide a source of secondary pollution when disposed of.

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

6.3.5 Alternative Water Sources

6.3.5.1 Rainwater Harvesting

Rainwater harvesting involves collecting and storing rainwater for mining activities, including ore processing, dust suppression, and worker hygiene. This method is environmentally sustainable and helps reduce reliance on local groundwater or surface water sources, particularly in regions prone to water scarcity. However, effective rainwater harvesting requires adequate storage infrastructure, filtration systems, and seasonal planning to ensure continuous supply. Implementing this approach in demonstration centers could showcase its potential benefits to ASG miners and encourage widespread adoption in water-stressed areas.

6.3.5.2 Groundwater (Boreholes & Wells)

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

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

⁵ [Guide.pdf \(unep.org\)](#)

6.3.6 Alternative Power Sources

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

7 CHAPTER SEVEN: IMPACTS MITIGATION MEASURES

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

7.1 MITIGATION MEASURES FOR IMPACTS DURING CONSTRUCTION

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

Table 7-1: Mitigation Measures for the Construction Phase

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

Phase/Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> ● Ensure Job Safety Hazard analysis is conducted prior to commencing work and required mitigation measures are in place
	Potential for accidents due to falling objects	<ul style="list-style-type: none"> ● Ensure safety signs are placed at strategic areas to provide warning ● Provide PPE and enforce usage ● Provide tool-holding equipment for persons working at height
	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> ● Provide manual handling and lifting training. ● Use mechanical lifting and transporting equipment/ devices e.g. pulley,
	Generation of construction wastes (cement bags/mixed cement/concrete)	<ul style="list-style-type: none"> ● Institute a waste management program that promotes waste segregation ● Have a recyclable waste storage facility that is secured ● Identify permitted contractors/persons who can collect and recycle the wastes ● Avoid wasteful practices ● Use hardened cement and concrete debris as core
Rehabilitation of degraded land, landscaping, and tree planting	Improved health and safety due to backfilling of mining pits and excavations and levelling off the ground	<ul style="list-style-type: none"> ● Landscape the area to promote aesthetic appeal ● Plant trees and vegetation that is common to the floristic region ● Use drought resistance and low-maintenance vegetation
	Exposure to loosen soil that may wash into waterways and cause siltation	<ul style="list-style-type: none"> ● Landscape to ensure non-scouring/erosion-promoting slopes ● The landscaping should ensure minimum areas are left bare ● Include sedimentation basins in the drainage
	Change in drainage patterns	<ul style="list-style-type: none"> ● Landscape according to the natural topography ensuring free draining ● Include water crossings for areas with defined drainage channels
	Improved biodiversity due to encouraging and planting vegetation	<ul style="list-style-type: none"> ● Landscape the area to promote aesthetic appeal ● Plant trees and vegetation that is common to the floristic region ● Use drought resistance and low-maintenance vegetation that can thrive without the need for care
	Improved aesthetics	<ul style="list-style-type: none"> ● Landscape the area to promote aesthetic appeal ● Plant trees and vegetation that is common to the floristic region ● Use drought resistance and low-maintenance vegetation that can thrive without the need for care
Transit of supplies and project personnel to and from the site	Increased traffic increases the potential for accidents in the community especially for children	<ul style="list-style-type: none"> ● Ensure traffic management rules are in place and communicated to employees ● Provide awareness to the community members

Phase/Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> • Ensure operators are trained and certified according to the national driving requirements and in addition the project specific driver training • Liaise with TARURA and install safety signs on community roads
Use of heavy equipment	Potential for hydrocarbon spills	<ul style="list-style-type: none"> • Contractor will be required to use appropriate fueling equipment with spill prevention measures when refueling onsite • Use of plastic drums and mats under heavy
Provision of food to employees	Generation of food waste	<ul style="list-style-type: none"> • Engage local food vendors who will prepare food offsite and bring food in reusable utensils and containers • Properly segregate food waste to ensure no harmful objects are contained and identify recycling opportunities • Consider having a composting unit • Ensure the eating area is kept clean and the dust bin sealed to discourage vermin infestation
Provision of drinking water	Potential for communicable diseases due to the use of unsafe water supply	Ensure access to adequate amounts of potable water
	Generation of light plastic waste (water bottles)	<ul style="list-style-type: none"> • Ensure recyclable plastics collection point is available • Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection
	Increased water demand in community water supply	Consider the provision of bottled water or bulk water supply
Employee hygiene	Potential for the spread of communicable diseases due to the use of unsanitary washrooms	<ul style="list-style-type: none"> • Provide adequate facilities for sanitary convenience e.g. mobile toilets and mobile septic tanks • Engage cleaners to ensure that they are kept in hygienic conditions • Frequently empty full sewage tanks utilizing permitted contractors
Sourcing of Labor	Immigration of construction workers	<ul style="list-style-type: none"> • Adopt principles included in Labor Management Plan where unskilled workers will be locally hired through the village authority • No migrant Labor will be employed by the project • Specialized work will be undertaken by contractors who will be responsible for managing their employees
	Unfair employment terms to local people	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors

Phase/Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> • Ensure that employees are provided with contracts as per Employment and Labor relations act 2004 • Ensure Labor rights and responsibilities specific training is provided to both contractor and employee the district authority responsible for Labor • Ensure the project and contractor has a grievance mechanism and that employees are aware of it
	Unfair employment terms to Women	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors
	Potential for child Labor	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors
Construction of the facility	Unrestricted access to construction site	<ul style="list-style-type: none"> • Erect perimeter fencing or barriers around all active construction zones to restrict entry. • Install warning signs and information boards at access points, clearly indicating restricted areas, hazards, and emergency contacts. • Conduct community awareness campaigns to inform nearby residents about construction dangers and restricted zones. • Develop and enforce a site-specific Health, Safety, and Security Plan (HSSP) addressing access control and emergency response.
	Vibration from construction equipment	<ul style="list-style-type: none"> • Maintain safe buffer zones between vibration-generating equipment and sensitive structures. • Use modern, well-maintained machinery with low-vibration technology and ensure equipment is properly balanced and serviced. • Restrict high-vibration activities (such as pile driving or compaction) to daytime hours to minimize community disturbance. • If vibration levels exceed limits, temporarily halt operations and adopt alternative construction methods or equipment where feasible
	Dust from construction activities	<ul style="list-style-type: none"> • Regularly spray water on exposed surfaces, haul roads, and construction zones, especially during dry and windy periods. • Cover trucks and stockpiles carrying or storing fine materials (soil, sand, aggregates) to prevent wind dispersion. • Schedule construction activities likely to generate high dust levels during less windy periods.

Phase/Activity	Potential Impact	Proposed Mitigation
	Pollutant gases from construction equipment	<ul style="list-style-type: none"> ● Stabilize and revegetate cleared or inactive areas as soon as possible. ● Use well-maintained and regularly serviced equipment to ensure efficient fuel combustion and reduce exhaust emissions. ● Prohibit the use of obsolete or poorly maintained machinery that produces visible smoke or excessive emissions. ● Limit engine idling time and enforce a strict “no unnecessary idling” policy for vehicles and machinery.
Demobilization of construction workers	Increase number of single women and child headed families due to abandoning families	<ul style="list-style-type: none"> ● Provide awareness to project employees and community pertaining to interactions ● Ensure the project and contractor has a grievance mechanism and that employees are aware of it ● Engage local NGOs who work on these matters to assist

7.2 MITIGATION MEASURES FOR IMPACTS DURING OPERATIONS

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

- Conserving or eliminating the need for mercury and other reagents, saving costs
- Saving time by more efficient processing
- Recovering more gold by improving extraction techniques, which might include using better technology or using existing technology better
- Getting a better price for gold by following standards that get a better market price (incentives)⁶

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

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

Table 7-2: Mitigation Measures for Operation Impacts

Activity	Potential Impact	Proposed Mitigation
Drying of ore	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> • Provide manual handling and lifting training. • Use mechanical lifting and transporting equipment/ devices e.g. pulley,
	Generation of sediments that may wash into waterways	Construct drainage around the site and sediment trap prior to discharge
Crushing of ore using hand hammers	Generation of undesirable levels of noise by the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> • Conduct activities during daytime hours • Provide hearing protection to employees
	Generation of dust exposure to workers	<ul style="list-style-type: none"> • Ensure workers receive training prior to commencing work • Provide PPE and enforce usage • Engage HSE Officer as part of the construction crew • Install mechanical crusher plants • Apply water as a dust suppressant in mechanical crushers
	Increased potential for finger injuries due to the use of hand hammers	<ul style="list-style-type: none"> • Provide PPE and enforce usage • Ensure job hazards analysis is conducted and mitigation measures are in place • Install mechanical crusher plants
	Exposure of children to mine hazards due to being at the mine site with mothers for care	Liaise with NGOs and community on the support system for child care while the mother is working
Grinding/milling using crushers	Generation of undesirable levels of noise	<ul style="list-style-type: none"> • Conduct activities during daytime hours • Provide hearing protection to employees
	Generation of dust	<ul style="list-style-type: none"> • Conduct activities during daytime hours • Provide respiratory protection to employees
	Potential for injuries due to being exposed to moving parts of the crusher	<ul style="list-style-type: none"> • Provide mechanical guards • Isolate the crushers to limit access of
	Generation of metal waste (steel balls and work crushers)	Engage recyclable waste contractors
Supplying of power to the crushers	Generation of noise from the onsite generators	<ul style="list-style-type: none"> • Improve the availability of national grid power • Conduct activities during daytime hours • Provide hearing protection to employees
	Emission of noxious gases from generators	<ul style="list-style-type: none"> • Improve the availability of national grid power

Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> • Service generators as per manufacturer's recommendations
	Increased potential for hydrocarbon spills polluting land and water	<ul style="list-style-type: none"> • Generators should be placed in enclosures with their covers in place • Service generators as per manufacturer's recommendations
	Potential for fire from power generators	<ul style="list-style-type: none"> • Service generators as per manufacturer's recommendations • Install fire extinguishers within proximity of generators
Sluicing	Potential for inhalation of dust during handling of milled ore	Provision of PPE to workers
	Increased water demand for sluicing	<ul style="list-style-type: none"> • Continue practice of removing sediments and reusing excess water
	Generation of sediment loaded wastewater	<ul style="list-style-type: none"> • Install sediment traps at discharge sites
	Increasing potential for sedimentation in water resources due to improper storage of generated tailings	<ul style="list-style-type: none"> • Improve facilities for tailings storage to have cut-off drainage that isolates the tailings from runoff
	Potential for slip and fall and drowning from the sluicing plant drainage and sediment traps	<ul style="list-style-type: none"> • Provide covers for the drainage system • Barricade the drainage to limit exposure
Amalgamation	Exposure of employees' elemental mercury by contact	<ul style="list-style-type: none"> • Provide hand and respiratory PPE
	Generation of wastewater that contains mercury in the amalgam pool	<ul style="list-style-type: none"> • Provide training on how to improve the planning process to increase mercury recovery • Reuse water in the amalgamation pool in the panning
	Generation of mercury-laden tailings	<ul style="list-style-type: none"> • Improve facilities for tailings storage to have cut-off drainage that isolates the tailings from runoff
	Generation of gold that contains mercury as impurity	<ul style="list-style-type: none"> • Use retort in removal of excess mercury from amalgam to promote recapture and reuse
	Promoting continued mercury production and trade	<ul style="list-style-type: none"> • Investigate on increasing efficiency, availability and cost effectiveness of non-mercury processes • Investigate on mechanisms that can provide subsidy to VAT chemicals so they can be more affordable to ASGM • Encourage banks to provide finance ASGM eliminating the need for quick cash to finance mining operations and VAT extraction that leads to requiring fast cost cost-effective leaching using mercury
Removal of mercury and impurities in	Increased demand for charcoal and firewood	<ul style="list-style-type: none"> • Use alternative energy sources e.g. LPG and acetylene blow torch
	The release of mercury in the air causes pollution	<ul style="list-style-type: none"> • In cooperation with ASGM investigate how to promote the use of retorts and/or fume hoods.

Activity	Potential Impact	Proposed Mitigation
gold amalgam via heating		<ul style="list-style-type: none"> Enforce regulations mandating the use of retort
	Exposure of employees to mercury aerosols	<ul style="list-style-type: none"> In cooperation with ASGM investigate how to promote the use of retorts and/or fume hoods. Enforce regulations mandating the use of retort
	Generation of ashes that may contain mercury	Improve facilities for ashes storage to have cut-off drainage that isolates the ashes from runoff
	Generation of mercury-contaminated waste from utilizing retort	ASGM should have facilities for the storage of mercury-contaminated waste. E.g. steel drums used to supply metal balls for the mills
Provision of food to employees	Generation of food waste	<ul style="list-style-type: none"> Discourage food consumption at the site Provide employees with lunch breaks so they can go and eat elsewhere
	Consuming contaminated food (Mercury/dust) as most eat at their worksite	<ul style="list-style-type: none"> Discourage food consumption at the site Provide employees with lunch breaks so they can go and eat elsewhere
Provision of drinking water	Potential for communicable diseases due to the use of unsafe water supply	Ensure access to adequate amounts of potable water
	Generation of light plastic waste (water bottles)	<ul style="list-style-type: none"> Ensure recyclable plastics collection point is available Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection
	Increased water demand in community water supply	Consider the provision of bottled water or bulk water supply
Employee hygiene	Potential for the spread of communicable diseases due to the use of unsanitary washrooms	<ul style="list-style-type: none"> Provide adequate facilities for sanitary convenience Engage cleaners to ensure that they are kept in hygienic conditions Frequently empty full sewage tanks utilizing permitted contractors
Sourcing of Labor	Immigration of construction workers	<ul style="list-style-type: none"> Operational staff to be provided by the cooperative managing the PML
	Unfair employment terms to local people	<ul style="list-style-type: none"> Include adherence to Labor requirements in agreement with the cooperative Ensure that employees are provided with contracts as per Employment and Labor Relations Act 2004

Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> ● Ensure Labor rights and responsibilities specific training is provided to both cooperative managers and employees the district authority responsible for Labor ● Ensure the project and contractor have a grievance mechanism and that employees are aware of it
	Unfair Employment Terms to Women	<ul style="list-style-type: none"> ● Include adherence to Labor requirements in contracts for engaged contractors
	Potential for child Labor	<ul style="list-style-type: none"> ● Include adherence to Labor requirements in contracts for engaged contractors
Operation of the facility	Unrestricted access to the facility	<ul style="list-style-type: none"> ● Erect secure perimeter fencing around the entire facility to prevent unauthorized entry. ● Install controlled access points with security personnel and monitoring systems. ● Place clear warning signs at all entrances and hazardous areas indicating restricted access, hazards, and emergency contacts. ● Enforce a strict facility access policy for employees, contractors, and visitors. ● Maintain adequate lighting around the facility at night to discourage unauthorized access.
	Failure or lack of facility maintenance leading to pollution	<ul style="list-style-type: none"> ● Develop and implement a Preventive Maintenance Plan (PMP) for all equipment, tanks, pipelines, and drainage systems. ● Conduct regular inspections of storage tanks, chemical handling areas, and wastewater treatment units. ● Ensure prompt repair or replacement of faulty or damaged equipment to prevent leaks and spills. ● Train facility personnel on safe handling, storage, and maintenance of hazardous substances. ● Install secondary containment systems (e.g., bunds, trays) around storage tanks and chemical areas. ● Maintain spill response kits and emergency procedures on-site for rapid containment and cleanup
	Vibration from crushing the ores	<ul style="list-style-type: none"> ● Maintain buffer zones between crushers and nearby buildings or community areas.

Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> ● Install vibration dampening systems such as shock absorbers or rubber mounts on machinery where feasible ● Train operators on vibration control practices and proper equipment maintenance ● If excessive vibration is detected, adjust crushing operations or adopt alternative methods to reduce impact.
	Dust from grinding, and crushing of ore	<ul style="list-style-type: none"> ● Implement regular water spraying or wet grinding techniques to suppress dust generation. ● Ensure all conveyors and transfer points are covered to minimize fugitive dust emissions. ● Maintain proper ventilation in enclosed grinding and crushing areas to prevent accumulation of dust. ● Provide personal protective equipment (PPE) such as dust masks or respirators to workers. ● Conduct routine maintenance and inspection of dust control equipment to ensure proper functioning ● Implement housekeeping measures to regularly clean dust-prone areas within the facility
	Mercury dust from amalgamation of gold	<ul style="list-style-type: none"> ● Use enclosed amalgamation systems or retorts to capture mercury vapors and prevent their release into the air ● Provide personal protective equipment (PPE), including respirators, gloves, and protective clothing, for all workers handling mercury ● Implement proper storage protocols for mercury in secure, labeled containers with spill containment measures. ● Conduct regular training for workers on safe mercury handling, storage, and spill response. ● Ensure proper disposal of mercury-contaminated residues according to hazardous waste regulations.
	Pollutant gases from generator and burning wastes	<ul style="list-style-type: none"> ● Use well-maintained, fuel-efficient generators with emission control systems. ● Operate generators in well-ventilated or isolated areas to minimize exposure to workers and communities.

Activity	Potential Impact	Proposed Mitigation
		<ul style="list-style-type: none"> ● Limit generator operation to essential periods and avoid unnecessary idling. ● Avoid open burning of waste; implement proper waste segregation, storage, and disposal systems. ● Use covered waste storage areas to prevent accidental fires and smoke release. ● Train workers on proper generator operation, fuel handling, and waste management practices. ● Conduct regular air quality monitoring to measure CO, NO_x, SO_x, and PM emissions around the site.

7.3 MITIGATION MEASURES DURING THE DECOMMISSION PHASE

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

Table 7-3: Mitigation measures

Activity	Potential Impact	Mitigation Measure
Dismantling of mine and plant infrastructures and 'leveling	<ul style="list-style-type: none"> Deterioration in ambient air quality due to dust and particulate matter (PM10 and PM2.5) 	<ul style="list-style-type: none"> Provision of enough PPEs to all workers on site and mandate their use All dismantling activities should be limited to a day time <p>Assign qualified supervisors or safety officers to ensure that all safety protocols are being followed</p>
Generation and management of wastes	<ul style="list-style-type: none"> Increased noise and vibrations that may lead to nuances and damage of properties 	<ul style="list-style-type: none"> Timely collection and removal of waste by a certified contractor Good separation of waste
VAT closure activities	<ul style="list-style-type: none"> Deterioration of water quality affecting the use of groundwater and surface water as a natural resource <p>Exposure of employees to hazardous chemicals (Cyanide</p>	<ul style="list-style-type: none"> Proper disposal of hazardous waste through NEMC-certified contractor Mark hazardous zones or restricted areas Assign qualified supervisors or safety officers to oversee the operation and ensure that all safety protocols are being followed Storing chemicals in appropriate containers, ensuring they are properly labelled, tightly sealed, and stored in designated areas away from water sources

Activity	Potential Impact	Mitigation Measure
	and Lime) can lead to serious health effects such as neurological and behavioral disorders, kidney damage, respiratory problems, and even death	<ul style="list-style-type: none"> • Implementing measures to prevent spills, such as using secondary containment systems like spill berms or pallets to capture and contain leaks or spills • Keeping spill response kits readily available and ensuring they contain appropriate materials for containing and cleaning up hazardous chemicals <p>Developing and implementing proper drainage management systems to minimize the interaction of water from mine facilities and the receiving environment, particularly water sources</p>
Transportation of materials out of site	Accidents and injuries	<ul style="list-style-type: none"> • Provision of PPEs and enforcing their use during working hours • Mandate the use of appropriate Personal Protective Equipment, such as helmets, safety goggles, gloves, and high-visibility clothing, for all personnel operating or working close to heavy machinery • Provide trained First Aiders and First Aid kits at potential areas • Only qualified personnel should be employed • Engaging trained and certified drivers to ensure speed control & road safety
Site leveling and revegetation	Introduction of invasive species	Wherever possible, use native plant species in re-vegetation and restoration programs to reduce the risk of introducing invasive vegetation species

Activity	Potential Impact	Mitigation Measure
Decommissioning	Soil contamination from residual chemicals, hydrocarbons, and processing reagents	<ul style="list-style-type: none"> • Dismantle equipment and structures carefully to avoid accidental release of chemicals or sediments into water bodies. • Treat and neutralize contaminated water before discharge using approved methods. • Properly remove, transport, and dispose of tailings, chemicals, and hazardous residues through licensed facilities. • Conduct soil stabilization and re-vegetation in cleared areas to reduce erosion and runoff.
	Water pollution from leakage or runoff of contaminated materials into nearby rivers, streams, or groundwater.	Refer to above
	Improper waste disposal (e.g., tailings, construction debris, and scrap materials) leading to long-term environmental hazards.	<ul style="list-style-type: none"> • Collect and transport tailings, chemicals, and hazardous residues to licensed hazardous waste treatment or disposal facilities. • Establish temporary, secure storage areas for hazardous and non-hazardous waste before disposal.

Activity	Potential Impact	Mitigation Measure
	Loss of employment and income for workers and local service providers following closure.	<ul style="list-style-type: none"> • Provide advance notice of closure to allow workers and service providers to plan for transition
	In-migration or scavenging at the decommissioned site, leading to potential accidents or conflicts.	<ul style="list-style-type: none"> • Secure the site immediately after decommissioning using fencing, barriers, and warning signage. • Remove or safely store hazardous materials, chemicals, and equipment to eliminate incentives for scavenging. • Complete site rehabilitation promptly, including removal of debris, land stabilization, and re-vegetation, to discourage unauthorized entry.
	Reduced local economic activity affecting small businesses dependent on the facility.	<ul style="list-style-type: none"> • Encourage linkages with other projects or government programs to create alternative income opportunities. • Conduct stakeholder engagement and awareness campaigns to inform businesses of closure timelines and available support.

8 CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) outlines measures to manage social and environmental impacts and risks identified during the project's lifecycle. It specifies mitigation actions, demonstrates organizational capacity and resources to implement them, ensures compliance with laws, and aims to minimize negative impacts while enhancing benefits. The responsibility for the implementation of the ESMP is for the project implementor (PIT) NEMC in collaboration with the Mine Commission. Table 6-1 below presents the Environmental and Social Management Plan for the proposed project.

Table 8-1: Environmental and Social Management Plan

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
Construction Phase					
Construction of sluices, VAT leaching tanks, drainage, and amalgamation pool	Generation of dust from cement works	<ul style="list-style-type: none"> • Ensure construction workers receive training prior to commencing work • Provide PPE and enforce usage • Engage HSE Officer as part of the construction crew • Promote good cement handling and limit wasteful practices 	NEMC & HSE Manager	Standards included in the Environment Management (Air Quality Standards) Regulation, 2007 & WBG HSE Guideline (PM2.5 25 µg/m ³ PM10 50 µg/m ³)	10,000,000
	Potential for accidents due to falling in the foundation and sluice drainage/sediment trap excavations, and from working at height	<ul style="list-style-type: none"> • Demarcate all areas with falling hazards • Provide scaffolding for persons working at height • PPE and enforce usage • Ensure Job Safety Hazard analysis is conducted before commencing work and required mitigation measures are in place 		Zero incidents	Already included
	Potential for accidents due to falling objects	<ul style="list-style-type: none"> • Ensure safety signs are placed in strategic areas to provide warning • Provide PPE and enforce usage • Provide tool-holding equipment for persons working at height 		Zero incident	Already Included
	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> • Provide manual handling and lifting training. • Use mechanical lifting and transporting equipment/ devices e.g. pulley, 			

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Generation of construction wastes (cement bags/mixed cement/concrete)	<ul style="list-style-type: none"> Institute a waste management program that promotes waste segregation Have a recyclable waste storage facility that is secured Identify permitted contractors/persons who can collect and recycle the wastes Avoid wasteful practices Use hardened cement and concrete debris as core 		Minimal waste generation	NA
Rehabilitation of degraded land, landscaping and tree planting	Improved health and safety due to backfilling of mining pits and excavations and levelling the ground	<ul style="list-style-type: none"> Landscape the area to promote aesthetic appeal Plant trees and vegetation that are common to the floristic region Use drought-resistant and low-maintenance vegetation 	HSE Manager	Improved ecology of the area	20,000,000
	Exposure to loose soil that may wash into waterways and cause siltation	<ul style="list-style-type: none"> Landscape to ensure no scouring/erosion-promoting slopes The landscaping should ensure minimal areas are left bare Include sedimentation basins in the drainage 		Minimum soil disturbance within the project footprint	
	Change in drainage patterns	<ul style="list-style-type: none"> Landscape according to the natural topography, ensuring free draining Include water crossings for areas with defined drainage channels 		Restored drainage channels according to topographical	
	Improved biodiversity due to encouraging and planting vegetation	<ul style="list-style-type: none"> Landscape the area to promote aesthetic appeal Plant trees and vegetation that is common to the floristic region Use drought resistance and low-maintenance vegetation that can thrive without the need for care 		Restored ecology of the area	
	Improved aesthetics	<ul style="list-style-type: none"> Landscape the area to promote aesthetic appeal 		Restored ecology of the area	

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

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
Provision of drinking water	Potential for communicable diseases due to use of unsafe water supply	Ensure access to adequate amounts of potable water		Sufficient supply of clean water	
	Generation of light plastics waste (water bottles)	<ul style="list-style-type: none"> • Ensure recyclable plastics collection point is available • Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection 		Timely collection of waste to disposal site	
	Increased water demand in community water supply	Consider provision of bottled water or bulk water supply		Available clean water	
Employee hygiene	Potential for spread of communicable diseases due to use of unsanitary washrooms	<ul style="list-style-type: none"> • Provide adequate facilities for sanitary convenience e.g. mobile toilets and mobile septic tanks • Engage cleaner to ensure that they are kept in hygienic conditions • Frequently empty full sewage tanks utilizing permitted contractors 	& HSE Manager	Zero discharge of domestic waste	10,00,000
Sourcing of Labor	Immigration of construction workers	<ul style="list-style-type: none"> • Adopt principles included in Labor Management Plan where unskilled workers will be local hired through the village authority • No migrant Labor will be employed by the project • Specialized work will be undertaken by contractors who will be responsible for managing their employees 	Plant Manager	Local people employed	NA
	Unfair employment terms to local people	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors • Ensure that employees are provided with contracts as per Employment and Labor relations act 2004 • Ensure Labor rights and responsibilities specific training is provided to both contractor and 	Plant Manager	<ul style="list-style-type: none"> • Signed contracts • Grievance mechanism procedure 	Included in project investment cost for employees

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
		<p>employee the district authority responsible for Labor</p> <ul style="list-style-type: none"> • Ensure the project and contractor has a grievance mechanism and that employees are aware of it 			
	Unfair employment terms to Women	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors 		Reasonable contracts as per industry needs	
	Potential for child Labor	<ul style="list-style-type: none"> • Include adherence to Labor requirements in contracts for engaged contractors 		No Child under the age of 14 to be employed	
Demobilization of construction workers	Increase number of single women and child headed families due to abandoning families	<ul style="list-style-type: none"> • Provide awareness to project employees and community pertaining to interactions • Ensure the project and contractor has a grievance mechanism and that employees are aware of it • Engage local NGOs who work on these matters to assist 	NEMC, Plant Manager and HSE Manager	Resolved grievances	
Operation Phase					
Drying of ore	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> • Provide manual handling and lifting training. • Use mechanical lifting and transporting equipment/ devices e.g. pulley, 	Plant Manager and HSE Manager	Zero incident	Included in the cost below
	Generation of sediments that may wash into waterways	Construct drainage around the site and sediment trap prior to discharge		Less or no sediments loosely available	Included in investment cost
Crushing of ore using hand hammers	Generation of undesirable level of noise the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> • Conduct activities during daytime hours • Provide hearing protection to employees 		The Environmental Management (Standards for The Control of Noise and Vibration Pollution) Regulations, 2011) & WBG HSE Guideline 70dBA for site and	30,000,000
	Generation of dust exposure to workers	<ul style="list-style-type: none"> • Ensure workers receive training prior to commencing work • Provide PPE and enforce usage 			

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
		<ul style="list-style-type: none"> Engage HSE Officer as part of construction crew Install mechanical crusher plants Apply water as dust suppressant in mechanical crushers 		55DbA and 45dBA at nearby receptors at night and day hours	
	Increased potential for finger injuries due to the use of hand hammers	<ul style="list-style-type: none"> Provide PPE and enforce usage Ensure job hazards analysis is conducted and mitigation measures are in place Install mechanical crusher plants 		Zero incident	
	Exposure of children to mine hazards due to being at the mine site with mothers for care	Liaise with NGOs and community on the support system for child care while the mother is working		No Child employment	
Grinding/milling using crushers	Generation of undesirable levels of noise	<ul style="list-style-type: none"> Conduct activities during daytime hours Provide hearing protection to employees 		Zero incident	
	Generation of dust	<ul style="list-style-type: none"> Conduct activities during daytime hours Provide respiratory protection to employees 		Standards included in the Environment Management (Air Quality Standards) Regulation,2007 & WBG HSE Guideline 70dBA for site and 55DbA and 45dBA at nearby receptors at night and day hours	
	Potential for injuries due to being exposed to moving parts of the crusher	<ul style="list-style-type: none"> Provide mechanical guards Isolate the crushers to limit access of 		Zero incident	
	Generation of metal waste (steel balls and work crushers)	Engage recyclable waste contractors		Minimal waste	
Supplying of power to the crushers	Generation of noise from the onsite generators	<ul style="list-style-type: none"> Improve availability of national grid power Conduct activities during daytime hours Provide hearing protection to employees 	Reliable source of power		

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Emission of noxious gases from generators	<ul style="list-style-type: none"> • Improve availability of national grid power • Service generators as per manufacturer's recommendations 		Standards included in the Environment Management (Air Quality Standards) Regulation,2007 & WBG HSE Guideline for ambient air quality standards	
	Increased potential for hydrocarbon spills polluting land and water	<ul style="list-style-type: none"> • Generators should be placed in enclosures with their covers in place • Service generators as per manufacturer's recommendations • Provide spill kits 		No Spills	
	Potential for fire from power generators	<ul style="list-style-type: none"> • Service generators as per manufacturer's recommendations • Install fire extinguishers within proximity of generators 		Zero source of fire hazard close to the generator	
Sluicing	Potential for inhalation of dust during handling of milled ore	Provision of PPE to workers		Standards included in the Environment Management (Air Quality Standards) Regulation,2007	
	Increased water demand for sluicing	Continue practice of removing sediments and reusing excess water		Re-use of water	
	Generation of sediment loaded waste water	Install sediment traps at discharge sites		Best Industrial Practice	
	Increasing potential for sedimentation in water resources due to improper storage of generated tailings	Improve facilities for tailings storage to have cut off drainage that isolates the tailings from runoff			
	Potential for slip and fall and drowning from the sluicing	<ul style="list-style-type: none"> • Provide covers for the drainage system • Barricade the drainage to limit exposure 		Zero incident	

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	plant drainage and sediment traps				
Amalgamation	Exposure of employee's elemental mercury by contact which can lead to serious health effects such as neurological and behavioral disorders, kidney damage, respiratory problems, and even death	<ul style="list-style-type: none"> • Provide hand and respiratory PPE • Ensure enough ventilation 		Zero incident	
	Generation of waste water that contain mercury in the amalgam pool which could potentially contaminate sources of water in not disposed according	<ul style="list-style-type: none"> • Provide training on how to improve panning process to increase mercury recovery • Reuse water in the amalgamation pool in panning 		Zero discharge to environment	
	Generation of mercury laden tailings	Improve facilities for tailings storage to have cut off drainage that isolates the tailings from runoff	HSE Manager and Plant Manager	Zero Discharge	Included in project Investment cost
	Generation of gold that contains mercury as impurity	Use retort in removal of excess mercury from amalgam to promote recapture and reuse		Zero discharge to environment	
	Promoting continued mercury production and trade	<ul style="list-style-type: none"> • Investigate on increasing efficiency, availability and cost effectiveness of non-mercury processes • Investigate on mechanisms that can provide subsidy to VAT chemicals so they can be more affordable to ASGM • Encourage banks to provide finance ASGM eliminating the need for quick cash to finance mining operations and VAT extraction that leads to requiring fast cost-effective leaching using mercury 	NEMC	NA	Included in Investment cost
	Increased demand for charcoal and firewood	Use alternative energy sources e.g. LPG and acetylene blow torch	NEMC	Clean energy	

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
Removal of mercury and impurities in gold amalgam via heating	Release of mercury in air causing pollution	<ul style="list-style-type: none"> • In cooperation with ASGM investigate on how to promote the use of retorts and/or fume hoods. • Enforce regulations mandating the use of retort 	NEMC and HSE Manager	Standards included in the Environment Management (Air Quality Standards) Regulation,2007 & WBG HSE Guideline ffor Air Quality	
	Exposure of employees to mercury aerosols can lead to serious health effects such as neurological and behavioural disorders, kidney damage, respiratory problems, and even death	<ul style="list-style-type: none"> • In cooperation with ASGM investigate how to promote the use of retorts and/or fume hoods. • Enforce regulations mandating the use of retort 			
	Generation of ashes that may contain mercury	Improve facilities for ashes storage to have cut-off drainage that isolates the ashes from runoff			
	Generation of mercury-contaminated waste from utilizing retort	ASGM should have facilities for the storage of mercury-contaminated waste. E.g. steel drums used to supply metal balls for the mills			
VAT Leaching of tailings	Exposure of employees to hazardous chemicals (Cyanide and Lime) can lead to serious health effects such as neurological and behavioural disorders, kidney damage, respiratory problems, and even death	<ul style="list-style-type: none"> • Ensure workers receive training prior to commencing work • Provide PPE and enforce usage • Have a chemical handler trained and certified by GCLA 	HSE Manager	Zero incident	Already included
	Generation of mercury and other leaching by products laden tailings	Remove mercury from tailings obtained from amalgamation pool prior to VAT leaching		Zero discharge to the environment	NA
	Increased water demand	Improve water recovery and management to reduce the need for fresh water			NA
	Exposure of employees to drowning in the VAT tanks	Provide barricade and warning signs at leach tanks		Zero Incident	Already Included

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Generation of chemical wastes from packaging	MC/NEMC/GCLA to provide affordable access to chemical waste dealers to ASGM		No discharge to environment	Included in investment cost
	Requirement of skilled Labor	<ul style="list-style-type: none"> GCLA in collaboration with MC to provide training to ASGM Require ASGM have formally trained employee in their structure 		Trained employees	Already Included
Provision of food to employees	Generation of food waste	<ul style="list-style-type: none"> Discourage food consumption at site Provide employees with lunch break so they can go and eat elsewhere 	HSE Manager	No food consumption at site	NA
	Consuming contaminated food (Mercury/dust) as most eat at their worksite	<ul style="list-style-type: none"> Discourage food consumption at site Provide employees with lunch break so they can go and eat elsewhere 	HSE and Plant Manager		
Provision of drinking water	Potential for communicable diseases due to use of unsafe water supply	Ensure access to adequate amounts of potable water	HSE Manager and Plant Manager	Sufficient supply of clean water	NA
	Generation of light plastics waste (water bottles)	<ul style="list-style-type: none"> Ensure recyclable plastics collection point is available Engage plastic waste collectors who are operating in Kahama town and identify economical means to promote recyclable waste collection 		Recycling of plastic waste	5,000,000
	Increased water demand in community water supply	Consider provision of bottled water or bulk water supply			
Employee hygiene	Potential for spread of communicable diseases due to use of unsanitary washrooms	<ul style="list-style-type: none"> Provide adequate facilities for sanitary convenience Engage cleaner to ensure that they are kept in hygienic conditions Frequently empty full sewage tanks utilizing permitted contractors 		Adequately and clean sanitary facilities	Included in investment cost
Sourcing of Labor	Immigration of construction workers	Operational staff to be provided by the cooperative managing the PML	Plant Manager	NA	NA

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	Unfair employment terms to local people	<ul style="list-style-type: none"> • Include adherence to Labor requirements in agreement with the cooperative • Ensure that employees are provided with contracts as per Employment and Labor relations act 2004 • Ensure Labor rights and responsibilities specific training is provided to both cooperatives managers and employee the district authority responsible for Labor • Ensure the project and contractor has a grievance mechanism and that employees are aware of it 	Plant Manager	<ul style="list-style-type: none"> • Employment and Labor relations act 2004 • Contract availability • Presence of grievance mechanism 	NA
	Unfair employment terms to Women	Include adherence to Labor requirements in contracts for engaged contractors		Contract signed for each employee	NA
	Potential for child Labor	Include adherence to Labor requirements in contracts for engaged contractors			
Drying of ore	Health and safety risks due to manual heavy lifting	<ul style="list-style-type: none"> • Provide manual handling and lifting training. • Use mechanical lifting and transporting equipment/ devices e.g. pulley, 	HSE Manager	Zero incident	Already Included
	Generation of sediments that may wash into waterways	Construct drainage around the site and sediment trap prior to discharge	Plant Manager	NA	Already included
Crushing of ore using hand hammers	Generation of undesirable level of noise the neighbours at the adjacent guest house and shops/bars	<ul style="list-style-type: none"> • Conduct activities during daytime hours • Provide hearing protection to employees 	HSE Manager	Zero Incident	
Decommission/ Closure Phase					
Dismantling of mine and plant infrastructures and 'leveling	<ul style="list-style-type: none"> • Deterioration in ambient air quality due to dust and particulate matter (PM10 and PM2.5) • Increased noise and vibrations that may lead to 	<ul style="list-style-type: none"> • Provision of enough PPEs to all workers onsite and mandate their use • All dismantling activities should be limited in a day time • Assign qualified supervisors or safety officers to ensure that all safety protocols are being followed 	NEMC and HSE Manager	<ul style="list-style-type: none"> • No incident • Environmental Management (Air Quality Standards,2007) & WBG HSE 	5,000,000

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
	nuances and damages of properties			Guideline for Air Quality	
Generation and management of wastes	<ul style="list-style-type: none"> • Deterioration of water quality affecting the use of ground water and surface water as a natural resource 	<ul style="list-style-type: none"> • Timely collection and removal of waste by a certified contractor • Good separation of waste • Proper disposal of hazardous waste through NEMC certified contractor • Mark hazardous zones or restricted areas • Assign qualified supervisors or safety officers to oversee the operation and ensure that all safety protocols are being followed • Storing chemicals in appropriate containers, ensuring they are properly labelled, tightly sealed, and stored in designated areas away from water sources • Implementing measures to prevent spills, such as using secondary containment systems like spill berms or pallets to capture and contain leaks or spills • Keeping spill response kits readily available and ensuring they contain appropriate materials for containing and cleaning up hazardous chemicals • Developing and implementing proper drainage management systems to minimize the interaction of water from mine facilities and the receiving environment, particularly water sources 	NEMC and HSE Manager	Zero Discharge	10,000,000
VAT closure activities	<ul style="list-style-type: none"> • Exposure of employees to hazardous chemicals (Cyanide and Lime) which can lead to serious health effects such as neurological and behavioural disorders, kidney damage, respiratory problems, and even death 				
Transportation of materials out of site	Accidents and injuries	<ul style="list-style-type: none"> • Provision of PPEs and enforcing their use during working hours • Mandate the use of appropriate Personal Protective Equipment, such as helmets, safety 	NEMC and HSE Manager	Zero incident	Already included

Phase/Activity	Potential Impact	Proposed Mitigation	Responsibility	Target	Cost (TSH)
		goggles, gloves, and high-visibility clothing, for all personnel operating or working in close proximity to heavy machinery <ul style="list-style-type: none"> ● Provide trained First Aiders and first Aid kit at potential areas ● Only qualified personnel should be employed ● Engaging trained and certified drivers to ensure speed control & road safety 			
Site leveling and revegetation	Introduction of invasive species	Wherever possible, use native plant species in re-vegetation and restoration programs to reduce the risk of introducing invasive vegetation species	NEMC and HSE Manager	No Invasive Alien Plant species, and the regrowth of indigenous species recorded	NA

9 CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

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

Sekenke One Mining Co. Society Ltd Site management will prepare monitoring procedures for each environmental setting as per local and internationally acceptable standards. This will ensure that the Monitoring plan for the given mitigation measures is accurately and properly done. The procedure will detail the attributes to be monitored, frequency, and institutional responsibility.

9.1 ASPECTS OF ENVIRONMENTAL MONITORING SYSTEM

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

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

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

The current cost of managing and implementing the site's Environmental Monitoring Plan is determined within the annual budget, utilizing monitoring procedures established at the project site the estimated annual cost for managing and implementing the site's environmental monitoring is **TZS10,500,000**. Table 8-1 below outlines the monitoring plan for the proposed project.

Table 9-1: Environmental Monitoring Plan

Potential Impacts	Parameter for Monitoring	Frequency	Monitoring Area	Measurement Unit	Target level/ Standard	Estimated Cost per sampling frequency (TZS)
Air pollution from emissions and fumes	Ambient Air quality parameters SO ₂ : 20, PM ₁₀ : 50, PM _{2.5} : 25	Continuous	Generator, galvanizing, and in emission areas	ug/Nm ³	Permissible Weight Concentrations of Emission Limits from the Atmosphere to a Receptor and respective test methods	2,000,000
Water abstraction	Amount of water abstracted	Monthly	Borehole	Meter cubic	As per abstraction permit	N/A
Alteration of Water Quality	<u>General Parameters</u> WB EHSGs in Mining, effluent guidelines: pH: 6-9 EC, TDS, TSS 50 mg/L Temp, Fluoride, Alkalinity, Phosphate, Nitrate, Nitrite, Cl, SO ₄ , Ca, Mg, K, Na, Ion Balance <u>Total Metals</u> – Fe, Cr. Dissolved Metals – As: 0.5 mg/L, Cd 0.05 mg/L, Cr 0.1 mg/L, Cu 0.3 mg/L, Fe: 2 mg/L, Hg: 0.002 mg/L, Ni, Pb: 02 mg/L, Sb, Zn: 05 mg/L.)	After every three months in normal condition	Effluent from the washing facilities	As stated in the Regulations	Permissible limits for Municipal and Industrial effluents	5,000,000

Potential Impacts	Parameter for Monitoring	Frequency	Monitoring Area	Measurement Unit	Target level/ Standard	Estimated Cost per sampling frequency (TZS)
Hazardous waste management	Amount generated	Monthly	Waste storage area	Kg or m3	All wastes disposed safely	400,000
Solid waste management	Amount generated	Weekly	Waste storage area	Kg or m3	All wastes disposed safely	300,000
Personal injuries	Record of injuries/accidents/near misses and work-related diseases	Continuous	On-site	OSHA specific units	Zero accident/ incident or injury	1,000,000
Fire explosion	All potential fire sources including electrical appliances and connections such as switches, panel boxes, the Electronic Data Verification System, and other equipment.	As per the Fire and Rescue Service Act	On-site	Service tag	No fire and awareness to all employees and visitors	2,000,000
Personal Protective Equipment (PPE) compliance	Workers without PPEs	Daily	Project area	n/a	Zero non-compliance	2,000,000
Increased noise Level	Noise levels	Continuous	Noisy areas/equipment	dBA	70dBA	500,000 Already included
	Noise levels	Continuous	Nearest sensitive receptors	dBA	45dBA at night, 55 dBA daytime	
Increased level of vibration	Vibration levels	Continuous	Onsite	mm/s PPV	5 mm/s PPV	500,000

Potential Impacts	Parameter for Monitoring	Frequency	Monitoring Area	Measurement Unit	Target level/ Standard	Estimated Cost per sampling frequency (TZS)
Soil erosion	Areas prone to erosion	After rainy period	A Areas prone to erosion	N/A	80% of area prone to erosion rehabilitated	N/A
Soil contamination	Mercury and hydrocarbon	Biannually	Project site	Mg/kg	WBG general Guidelines	500,000
Chemical storage and handling safety	Containment for storage	Monthly	Fuel and chemical storage	n/a	No chemical or fuel stored without containment	N/A
	Number of spills	Monthly	Project site	Spill incidence counts	Zero incidence	N/A
Traffic safety	Number of accidents	Monthly	Project site	Traffic incidents count	Zero incidence	N/A
Community grievances	Noise grievances	Monthly	Nearby community	Number of grievances	Zero grievances	N/A
	Dust grievance	Monthly	Nearby community		Zero grievances	N/A
	Water pollution grievance	Monthly			Zero grievances	N/A
	Water level grievances	Monthly	Nearby community		Zero grievances	N/A
Worker's welfare	Wages	Biannually	Project area	Minimum agreed wages	No below minimum agreed wages	N/A
	Working hours			12 hours	No more than 12 hours	
	Harassment			Harassment incidents	Zero Harassment incidents	
	Gender based violences			GBV	Zero GBV	
	Fair and safe working conditions			Nil	Nil	

Potential Impacts	Parameter for Monitoring	Frequency	Monitoring Area	Measurement Unit	Target level/ Standard	Estimated Cost per sampling frequency (TZS)
	Child labor			Number of child labors	Zero child labor	
Unrestricted access to the facility	Number of people trespassing	Monthly	Project facility	Zero trespassing	Zero unrestricted access	N/A
Increased demand for charcoal	Amount of charcoal required	Monthly	Project area	Number of sacks beyond baseline	Not more than 25 % than the baseline	N/A
Communicable diseases	Number of communicable diseases	Quarterly	Project workers	Number of communicable diseases incidences	Zero incidences	N/A
Introduction of invasive species during construction and closure	Invasive species	After construction and during closure	Project site	nil	All invasive plants removed and destructed	N/A
Failure or lack of facility maintenance leading to pollution	Leakage of tailing pond, or any part of the facility	Monthly	Facility	No leakage	No leakage	10,000,000
Employment loss	Number of workers at the facility	After decommissioning	Nil	No of workers	75% get other livelihood activities	N/A
TOTAL ESTIMATED ANNUAL BUDGET 10,500,000						

10 CHAPTER TEN: EMERGENCY PREPAREDNESS AND RESPONSE PLAN FOR NKONKILANGI IRAMBA

10.1 INTRODUCTION

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

10.2 SCOPE OF THE PLAN

This EPRP applies to all personnel involved in ASGM activities at the project area and covers the following emergency scenarios:

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

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

10.3 OBJECTIVES

The main objectives of this EPRP are to:

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

10.4 EMERGENCY RESPONSE ORGANIZATION

1.1.1 Emergency Response Team (ERT)

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

Table 10-1: Team Structure and Roles

Position	Name	Contact Information	Responsibilities
Emergency Coordinator	[Name]	[Phone Number]	Overall coordination during emergencies; decision-making; liaising with external agencies.
Safety Officer	[Name]	[Phone Number]	Monitoring safety measures; conducting training and drills; assessing hazards.
First Aid Responder	[Name(s)]	[Phone Number]	Providing immediate medical assistance; maintaining first aid supplies.
Fire Safety Officer	[Name]	[Phone Number]	Managing fire prevention measures; operating firefighting equipment.
Communication Officer	[Name]	[Phone Number]	Disseminating information during emergencies; maintaining communication equipment.
Evacuation Leader	[Name]	[Phone Number]	Leading and coordinating evacuation procedures; ensuring all personnel are accounted for.

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

10.5 EMERGENCY SCENARIOS AND RESPONSE PROCEDURES

1.1.2 Fire Outbreaks

Potential Causes

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

Prevention Measures

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

Response Procedure

Immediate Actions:

- Raise the Alarm:** The person who discovers the fire should shout "FIRE" loudly and notify others immediately.

- ii. **Notify Emergency Coordinator:** Inform the Emergency Coordinator or Safety Officer about the fire location and severity.
- iii. **Evacuate the Area:**
 - Proceed calmly to the nearest safe exit following designated evacuation routes.
 - Do not attempt to collect personal belongings.
 - Assist others in evacuating, especially those needing help.
- iv. **Attempt to Extinguish (If Safe):**
 - If the fire is small and manageable, trained personnel may attempt to extinguish it using available firefighting equipment.
 - Do not take unnecessary risks; prioritize personal safety.
- v. **Assemble at Designated Safe Zone:**
 - Gather at the predetermined assembly point [Specify Location].
 - The Evacuation Leader conducts a headcount to ensure everyone is accounted for.
- vi. **Contact External Support:**
 - If the fire is beyond control, the Communication Officer contacts local fire services through their phone number
- vii. **Do Not Re-Enter:**
 - No one should return to the affected area until declared safe by the Emergency Coordinator or relevant authorities.

1.1.3 Equipment and Resources

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

10.6 PIT WALL COLLAPSE/LANDSLIDES

1.1.4 Potential Causes

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

1.1.5 Prevention Measures

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

1.1.6 Response Procedure

Immediate Actions:

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

1.1.7 Equipment and Resources

- **Safety Helmets and Protective Gear:** Worn at all times during operations.
- **Warning Signs and Barriers:** Indicating hazardous zones and unstable areas.
- **Emergency Excavation Tools:** Shovels, ropes, and other tools for rescue efforts.
- **Communication Devices:** Radios or mobile phones for quick communication during emergencies.

10.7 MERCURY EXPOSURE AND POISONING

1.1.8 Potential Causes

- Improper handling and use of mercury during gold extraction.

- Lack of protective equipment when processing with mercury.
- Spillage or contamination of water and soil with mercury.

1.1.9 Prevention Measures

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

10.8 RESPONSE PROCEDURE

Immediate Actions:

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

- Review and improve safety measures to prevent future occurrences.

1.1.10 Equipment and Resources

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

10.9 MACHINERY AND EQUIPMENT ACCIDENTS

1.1.11 Potential Causes

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

1.1.12 Prevention Measures

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

1.1.13 Response Procedure

Immediate Actions:

- Stop Operations:** Immediately turn off and secure the machinery involved in the accident.
- Assess the Situation:**
 - Check for injuries and the condition of the injured person(s).
 - Identify any ongoing hazards (e.g., leaks, electrical risks).
- Provide First Aid:**
 - Administer appropriate first aid based on the injury.

- Do not move the injured person if spinal injuries are suspected unless necessary for safety.
- iv. **Contact Medical Services:**
- Call local emergency medical services for assistance.
 - Provide clear information about the nature and severity of injuries.
- v. **Secure the Area:**
- Keep non-essential personnel away from the accident scene.
 - Preserve the scene for any necessary investigations.
- vi. **Report the Incident:**
- Document the details of the accident including time, location, causes, and actions taken.
 - Review and update safety measures to prevent future incidents.

1.1.14 Equipment and Resources

- **First Aid Kits:** Accessible and well-stocked for treating various injuries.
- **Emergency Shut-off Mechanisms:** Clearly marked and functional on all machinery.
- **Communication Devices:** For immediate contact with emergency services.
- **Accident Report Forms:** Simplified forms to document incident details promptly.

10.10 MEDICAL EMERGENCIES

1.1.15 Potential Scenarios

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

1.1.16 Prevention Measures

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

1.1.17 Response Procedure

Immediate Actions:

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

1.1.18 Equipment and Resources

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

10.11 COMMUNICATION PLAN

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

1.1.19 Internal Communication

- i. **Methods:**
 - Verbal Alerts: Shouting specific alarms (e.g., "FIRE!", "EVACUATE!") for immediate attention.
 - Whistles/Horns: Using distinctive sounds to signal different types of emergencies.

- Mobile Phones/Two-Way Radios: For detailed communication among ERT members and personnel.

vii. Procedures:

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

1.1.20 External Communication

- **Emergency Services**

- Fire Department: (Phone numbers to be included)
- Medical Services: (Phone numbers to be included)
- Police/Security: (Phone numbers to be included)

- **Local Community Leaders:**

- Inform nearby communities when emergencies may impact them.

- **Media and Public Relations:**

- Designate a spokesperson to handle inquiries and provide accurate information.

1.1.21 Communication Equipment

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

10.12 TRAINING AND DRILLS

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

1.1.22 Training Programs

Frequency: Conduct training sessions at least twice a year.

Content:

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

1.1.23 Emergency Drills

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

10.13 RESOURCE MANAGEMENT

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

1.1.24 Equipment Maintenance

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

1.1.25 8.2. Resource Accessibility

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

10.14 POST-EMERGENCY ACTIONS

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

1.1.26 Incident Assessment

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

1.1.27 Recovery and Restoration

- Damage Assessment: Evaluate and document damages to property and environment.
- Restoration Plans: Develop and implement plans to repair and restore affected areas and resume normal operations.
- Support for Affected Individuals: Provide medical, psychological, and financial support as needed.

1.1.28 Plan Review and Update

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

10.15 CONCLUSION

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

11 CHAPTER ELEVEN: COST AND BENEFIT ANALYSIS

11.1 INTRODUCTION

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

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

11.2 PROJECT COSTS

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

Assigning a monetary value to each of these negative impacts based on current market rates, employing a combination of market value and payment methods for damages or impacts incurred, or using the cost of remedies such as dust control measures or provision of personal protective equipment (PPE), the total value of these impacts, including management and monitoring costs estimated in Chapter 8 and 9, amounts to approximately One hundred nine million Tanzanian shillings (109,000,000TZS). Determining the market prices or monetary values of environmental negative impacts poses considerable challenges, unlike project costs, as they cannot be readily quantified. Estimates of environmental costs are based on the assumption that these costs are equivalent to the expenses incurred for prevention or remedy measures, such as providing PPE or health insurance, following common industry practices.

11.3 PROJECT BENEFITS

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

Table 11-1: Benefits of Implementing the Project

Item	Amount	Details
Government investment for ASGM to facilitate gold production	25,000 USD	The government introduce Gold Ore Processing and Washing Facilities as alternative technologies to mercury for gold recovery in the ASGM as in the year 2020/which 2021.contributed 30% of total gold production (42 tonnes)
Taxes	Include taxes paid over the last financial year	Artisanal and Small-scale Gold Mining (ASGM) significantly contributes to the growth of the national GDP, with many ASGM operations in Iramba District paying taxes to the Government.
Fees and regulatory charges	Add different fees	Annual fees for OSHA, NEMC, Water
Employment	Insert total number of employees at Sekenke One Mining Co. Society Ltd include temporary laborers with % of those coming from the surrounding communities	ASGM in Tanzania contributed about 90% of the total employment in the mineral sector and much of this mining is a way of life supporting a variety of livelihoods

11.4 ANALYSIS

By comparing both the tangible and intangible expenses associated with the project, it becomes evident that it will create numerous opportunities for the village, ward, districts, and neighboring areas, benefiting the entire region and nation as a whole. The project will stimulate increased mining activities, leading to a rapid economic upliftment in the local communities and yielding various advantages. Additionally, the project's operations will generate short-term employment opportunities for the local population, including roles such as construction workers, security personnel, contractors, engineers, and Environmental Impact Assessment teams. Moreover, the project will result in additional benefits, including tax revenues from construction materials. Hence, the project promises significant economic and environmental advantages compared to the current state of the village and ward. Thus, the benefits

expected from the project outweigh the anticipated environmental and social costs over its lifespan.

12 CHAPTER TWELVE: CONCEPTUAL DECOMMISSIONING PLAN

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

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

13 CHAPTER THIRTEEN: SUMMARY AND CONCLUSION

Sekenke One Mining Co. Society Ltd Site is located at coordinates (04015'49.7' 'S, 34009'57.8'E) administratively being within Nkonkilangi Village, Ntwike Ward in Iramba district, Singida Region. The site can be accessed by driving 100 km north from Singida Town on the Dar to Mwanza tarmac highway branching off at Shelui Centre and then driving about 14kms on an all-weather gravel road to Nkonkilangi village center where the site is located.

Based on this project comprehensive management plans have been developed to address potential impacts associated with project activities. Detailed baseline studies have been conducted on the physical, biological, and socio-economic environments to ensure identification and mitigation of all potential Project-related impacts. The project offers significant socio-economic benefits to the proposed area, surrounding communities, Singida Region, and Tanzanian society as a whole. Except for the existing mining operation, the project is not expected to produce any significant adverse environmental or social impacts in the area.

The potential impacts identified are manageable through the proposed Environmental and Social Management Plan (ESMP) and take into consideration the Monitoring Plan. NEMC is committed to implementing the project in an environmentally sustainable manner, as evidenced by various activities already undertaken on-site. The proposed environmental management plans aim to ensure project activities are conducted in compliance with the national environmental regulations and internationally accepted best practices.

In summary, the proposed project should proceed as planned, as identified impacts will be effectively managed through implementation of the proposed EMP and Monitoring Plan, allowing the realization of the project's benefits.

REFERENCES

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

APPENDIX I: Primary Mining License

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF MINERALS
MINING COMMISSION



RENEWAL OF PRIMARY MINING LICENCE 006315CZ
The Mining Act, Cap. 123

I, Chone L. Malembo, the Resident Mining Officer for Singida Region, pursuant to the power conferred upon me under Section 56(2) of the Mining Act, Cap.123 hereby renew the Primary Mining Licence **PML006315CZ** granted to M/S **Sekenke One Mining Co-operative Society Ltd** of P.O Box 86, Kiomboi, Iramba, Tanzania in partnership with **Sekenke One Mining Co-operative Society Ltd** to prospect and mine for **Gold**, for a period of **7 years** effective from **27th May, 2023**.

The description of the renewed Primary Mining License is provided overleaf.

This licence is being renewed under the same terms and conditions of Primary Mining License **PML006315CZ**.

Signed this 30th day of JUNE 2023

A handwritten signature in blue ink, appearing to read 'Chone L. Malembo', written over a horizontal line.

Chone L. Malembo
For: **EXECUTIVE SECRETARY**