

ENVIRONMENTAL IMPACT STATEMENT REPORT

FOR THE

**PROPOSED COPPER PROCESSING PLANT ON FARM NO.
11383 IN MUMBWA DISTRICT OF CENTRAL PROVINCE BY
CEDARS MINERALS LIMITED**



Prepared By



SEPTEMBER, 2022

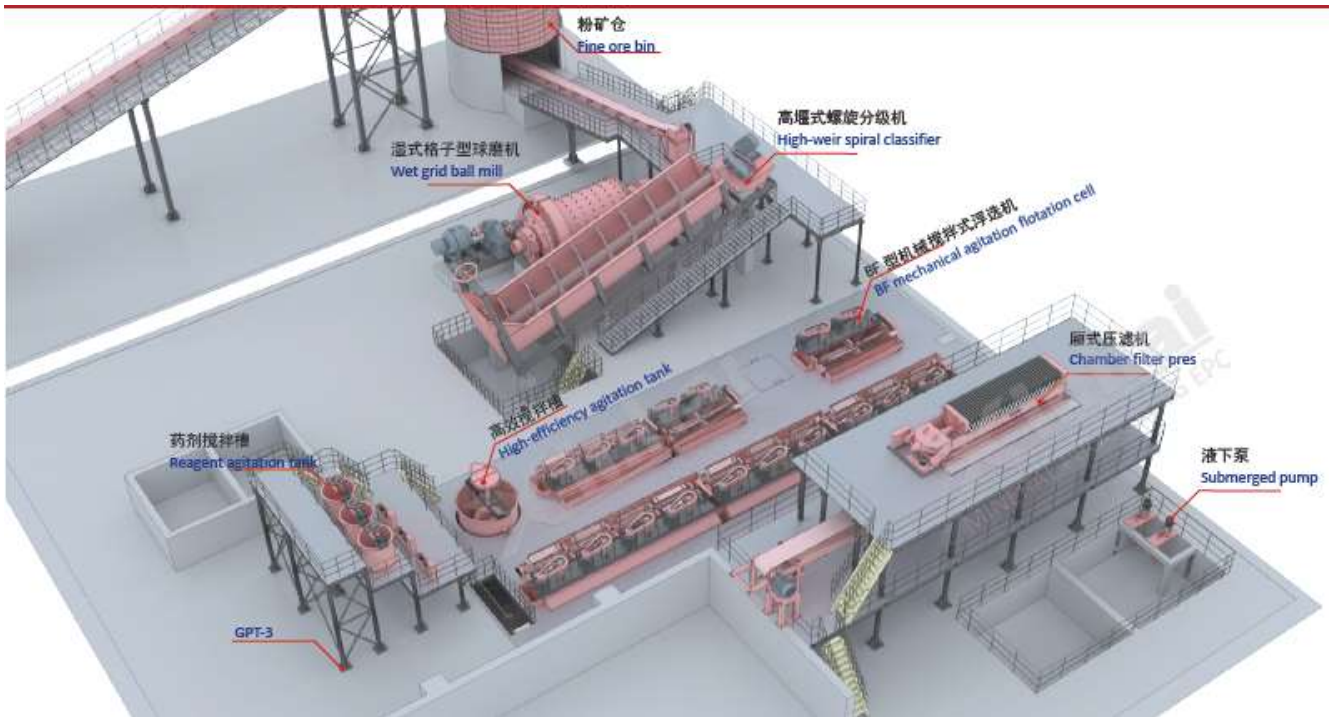


**COPPER PROCESSING PLANT ON FARM NO.
11383 IN MUMBWA DISTRICT**

Environmental Impact Statement




Draft Report

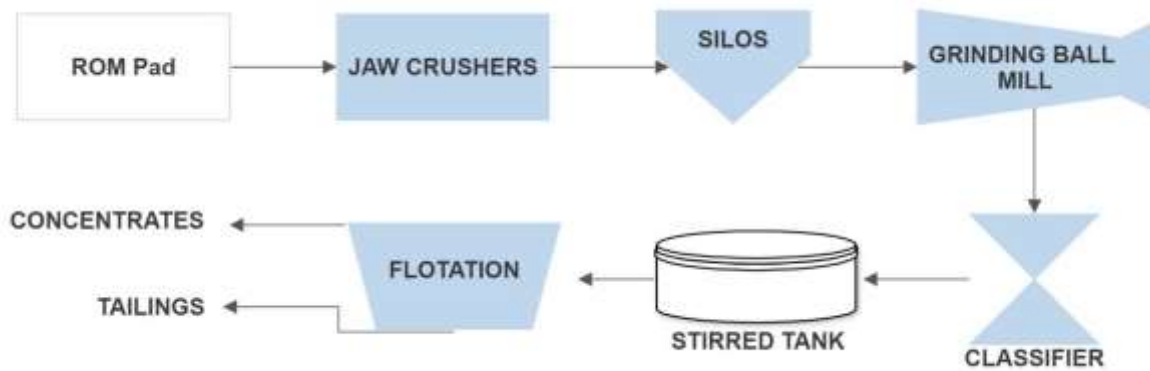
September, 2022



Prepared for
Cedars Minerals Limited

Revision Schedule

Rev	Date	Details	Prepared by	Reviewed by	Approved by
0	Sept 2022	EIS Report	Bwalya Mwale	Ernest Mwape	Patson Zulu Team Leader
1	Jan 2023				



Contact:

Patson Zulu
Chairman/CEO

E-mail: patsonzulu@gmail.com
Mobile: + +260 977470849/967470849



Copyright © ESEC LTD

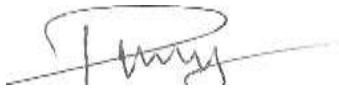
All rights are reserved. This document or any other part thereof may not be copied or reproduced without permission in writing from ESEC LTD.

QUALITY CONTROL PLAN

Project Title	Environmental Impact Assessment (EIA) for the Copper Processing Plant on Farm No. 11383 in Mumbwa district of Central Province of Zambia.
Contract No.	15/2022
Client	Cedars Minerals Limited (CML)
Contact Person	Mr. Julian Liu Director Cedars Minerals Limited

Document Prepared By	Environmental Science & Engineering Consultant Ltd. ESEC LTD, NDOLA.
Original Date Prepared	29/09/2022
Revision 1 Date	01/01/2023
Revision 2 Date	

Approved By:



Patson Zulu
(Team Leader)

29th September, 2022

(Date)

By signing, I certify that the document/report has been prepared and reviewed as per the quality assurance measures established by Environmental Science and Engineering Consultants Limited, Ndola.

TABLE OF CONTENTS

QUALITY CONTROL PLAN	ii
TABLE OF CONTENTS.....	iii
LIST OF TABLES	ix
LIST OF FIGURES.....	x
Acronyms and Abbreviations	xi
EXECUTIVE SUMMARY	xii
EXECUTIVE SUMMARY	xiii
Overview	xiii
Scope of the EIA study.....	xiii
Project Location and description	xiii
Project Objectives.....	xiv
Life Span	xv
Project Investment Cost.....	xv
Legal Framework	xv
Approach and Methodology.....	xv
Baseline Conditions	xv
Alternatives Considered.....	xvi
Potential Socio and Environmental Impacts.....	xviii
Negative impacts.....	xviii
Positive impacts	xviii
Environmental Management and Monitoring	xviii
Conclusion.....	xix
Declaration of Authenticity.....	xix
EIA STUDY TEAM	xx
NON TECHNICAL SUMMARY.....	xxii
NON TECHNICAL SUMMARY (Kaonde-Ila)	xxiii
I.....	xxiv
1. INTRODUCTION.....	1
1.1 Proposed Background	1
1.2 Project Justification/Rationale	1
1.3 Project Description.....	2
1.4 Proposed Project Location	3
1.5 Material Requirements	4
1.6 Estimated Cost and Start Date	4
1.7 Project Objectives	4
1.8 Legal and Administrative Framework.....	5
1.9 Need for the Environmental Impact Assessment (EIA)	5
1.10 ESEC LTD and EIA Terms of Reference	6
1.11 Overview on CML.....	6

1.12	Approach and Methodology	7
1.13	Initial Scoping with public consultation	7
1.14	Desktop study	8
1.15	Baseline Studies and Data Collection	8
2	9
	POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK	9
2.	LEGISLATIVE AND ADMINISTRATIVE FRAMEWORK	10
2.1	Environmental Policy/Plans/strategies	10
2.1.1	National Policy on Environment (NPE), 2009	10
2.1.2	National Conservation Strategy (NCS), 1985	10
2.1.3	National Environmental Action Plan (NEAP), 1994	11
2.1.4	National HIV and AIDS Strategic Framework (NASF), 2017 – 2021	11
2.2	National legislative framework	11
2.2.1	Environmental Management Act (EMA), 2011	11
2.3	Other Related Legal Framework	14
2.3.1	Standards Act No.4 of 2017	14
2.3.2	Metrology Act No. 6 of 2017	14
2.3.3	National Heritage Conservation Act, 1989	15
2.3.4	Land Act, 1995	15
2.3.5	Local Government Act No.4 2019	15
2.3.6	Factories Act, No. 2 of 1966	16
2.3.7	The Mines and Minerals Development Act No. 11 of 2015	16
2.3.8	Public Health Act, 1995	16
2.3.9	The Public Health Act (Infected Areas) (Coronavirus Disease 2019) Regulations, S.I 21 of 2020	16
2.3.10	Public Health Act (Corona Virus) Infectious Diseases S.I No. 21 of 2020	17
2.3.11	Water Resources Management Act, 2011	17
2.3.12	Employment Code Act, No. 3 of 2019	18
2.3.13	Public Roads Act, 2002 (amended in 2006)	18
2.3.14	National Council for Construction Act No. 10 of 2020	18
2.3.15	Electricity Act No. 11 of 2019	19
2.3.16	Forest Act of 2015 and S.I. No 11 of 2018	19
2.3.17	Road Traffic Act, 2002	19
2.3.18	Occupational Health and Safety Act, 2010	20
2.4	International Convention and Agreements	20
2.4.1	Convention on Biological Diversity (ratified in 1993)	20
2.4.2	Convention on Wetlands of International Importance (1975)	20
2.4.3	Convention Concerning the Protection of World Heritage (1972)	21
2.4.4	Protection of the World Cultural and Heritage (1972)	21
2.4.5	Ramsar Convention: -	21
2.4.6	African Convention on the Conservation of Nature and Natural Resources (Algiers, 1968), (Maputo, 2003):- ..	21
2.4.7	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):- ..	22
2.4.8	Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and their Disposal: - ..	22
2.4.9	Equator Principles Adopted for the Project	22
2.4.10	United Nations Framework Convention on Climate Change	23
2.5	Institutional Framework	23

3	25
PROJECT DESCRIPTION	25
3. PROJECT DESCRIPTION	26
3.1 History of the Project	26
3.2 Key Stakeholders	26
3.3 Justification of the Project.....	26
3.4 Description of the plant area	26
3.4.1 Location.....	26
3.4.2 Plant Component Description and Flow of Material	27
3.5 Relevant policy, legislative and planning framework	28
3.6 Identification of associated projects	29
3.7 Project Products and by- products	30
3.8 Resources for project implementation	31
3.10 Project Location	31
3.11 Size of Project Area	34
3.12 Nature of the Project	34
3.12.1 Raw Materials	36
3.14 Drainages	37
3.15 Security	37
3.16 Landscaping	37
3.17 Project Main Activities	37
3.17.1 Site Preparation phase.....	38
3.17.2 Construction phase	38
3.17.3 Operation phase	39
3.17.4 Decommissioning phase.....	41
4	43
ANALYSIS OF ALTERNATIVES	43
PROJECT ALTERNATIVES	44
4.1 Project Need.....	44
4.2 Site Alternative	44
4.3 Raw materials	44
4.4 Water Supply Alternative.....	45
4.5 Energy sources	45
4.6 Alternative Processing Technology/Methods	45
4.7 Waste Management Alternatives	45
4.8 Sewage management alternatives	45
4.9 The “No Action” or “No Project alternative”	46
5	47
DESCRIPTION OF THE BASELINE ENVIRONMENT	47
5. DESCRIPTION OF THE BASELINE ENVIRONMENT	48
5.1 Climate	48
5.1.1 Temperature	49
5.1.2 Relative Humidity	49
5.1.3 Sunshine	49

5.1.4 Rainfall	49
5.1.5 Wind	50
5.2 Soils	50
5.3 Topography	50
5.5 Air Quality and Noise.....	51
5.6 Hydrogeology	51
5.7 Hydrology	51
Surface Water	51
Water and Sewerage.....	52
5.8 Land Use / Land Tenure	52
5.9 Flora and Fauna.....	52
5.9.1 Flora Assessment	52
5.9.2 Fauna assessment	53
Aquatic fauna	53
Birds and Insects	53
5.10 Archaeology and Cultural Heritage.....	57
5.11 Traffic volume.....	57
5.12 Socio-economic conditions	57
5.12.1 Population of Mumbwa District	57
5.12.2 Development surrounding plant site	58
5.12.3 Economic Activities	58
5.12.4 Education.....	58
5.12.5 Health Facilities	58
5.12.6 Energy	59
5.12.7 Transport and Communication	60
5.12.8 Water Supply and Sanitation	60
5.12.9 Potential Resettlement and Compensation.....	60
6.....	61
POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MITIGATION MEASURES.....	61
6. POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MITIGATION MEASURES.....	62
6.1 Positive Impacts (Socio – economic impacts).....	62
6.1.1 Employment Opportunities	62
6.1.2 Improved Aesthetics of the area.....	62
6.1.3 Increased Public revenue	62
6.1.4 Multiplier Effect	62
6.2 Negative Impacts (Preparation/Construction/Operation Phases)	63
6.2.1 Direct impact on localized land and soil (construction and Operation).....	63
6.2.1.1 Impacts on biological existing environment (fauna and flora).....	63
6.2.1.2 Impacts on risk of fire.....	64
6.2.1.3 Impacts of the facility will have on the business within the vicinity of the proposed project site.....	64
6.2.2 Impact on Noise (construction and Operation).....	64
6.2.3 Impact on Air quality (Construction and Operation)	65
6.2.4 Solid Waste generation (Construction and Operation)	65
6.2.5 Generation of sewage (Operation)	66

6.2.6 Impact on ground water – abstraction related (construction and Operation)	66
6.2.7 Impact on Traffic and Road Safety (construction and Operation).....	66
6.2.8 Occupational Health and Safety (Construction and Operation)	66
6.2.9 Impacts on Archaeological/Historical/Cultural sites (Preparation)	67
6.3 The Evaluation of the Impacts Significance	67
6.3.1 Nature of the Impact	67
6.3.2 Duration	67
6.3.3 Intensity	68
6.3.4 Probability	68
6.3.5 Severity	69
6.3.6 Sensitivity	69
6.3.7 Determination of Significance	70
6.3.8 Significance Ranking Matrix	70
7	79
APPROACH AND METHODOLOGY	79
7.1 Introduction	80
7.2 Methodology	80
7.3 Data Collection.....	80
7.4 Mapping.....	81
7.5 Scoping Phase	81
7.6 Preparation of EIS	81
8	84
ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN	84
8 ENVIRONMENTAL MANAGEMENT PLAN	85
8.1 The Main Aim of the Environmental Management Plan.....	85
8.2 Surface Water Management.....	86
8.3 Erosion Control and Sediment Retention	86
8.4 Effluent Discharge and Treatment	86
8.5 Optimum Usage Processing Chemicals	86
8.6 Biomass Burning.....	87
8.7 Noise	87
8.8 Soil Erosion.....	87
8.9 Sediment Ponds.....	87
8.10 Sewerage effluent Sanitation Facilities.....	87
8.11 Occupational Safety and Health	87
8.12 Management of Hazardous Materials.....	87
8.13 Community Consultation and Interaction	88
8.14 Workforce Awareness	88
8.15 HIV/AIDS Awareness Program.....	88
9	100
ENVIRONMENTAL MONITORING PLAN	100
9. ENVIRONMENTAL MONITORING PLAN.....	101
9.1 Monitoring arrangements.....	101
9.2 Operational Phase	101

10. DISCUSSION CONCERNING AREAS AND ISSUES WHERE INFORMATION IS INCOMPLETE	112
11	113
DECOMMISSIONING AND CLOSURE PLAN	113
11. DECOMMISSIONING AND CLOSURE PLAN	114
11.1 Objectives.....	114
11.2 Decommissioning and rehabilitation investigations.....	114
11.2.1 Preliminary investigations	114
11.3 Decommissioning of infrastructure	114
11.3.1 Buildings	114
11.4 General site rehabilitation budget.....	115
12	117
EMERGENCY PREPAREDNESS AND RESPONSE PLAN	117
12. EMERGENCY PREPAREDNESS PLAN (EPP)	118
12.1 Scope.....	118
12.2 Procedures for Fires	118
13	121
CONCLUSION	121
13. CONCLUSION	122
14. DECLARATION OF AUTHENTICITY	123
15. REFERENCES	124
16. APPENDICES	126
APPENDIX A1: CURRICULUM VITAE	127
Patson Zulu	127
Abiud Banda	134
Alice Muyanga.....	137
Siame Ndanji.....	140
Ernest Mwape	143
Bwalya L. Mwale	147
Pride Kalale Katele.....	149
APPENDIX A2: SATELLITE MAP OF THE PROPOSED COPPER PROCESSING PLANT	154
APPENDIX A3: PHOTOS OF THE PROPOSED EXPANSION SITE AREA	155
APPENDIX B: SCOPING ADVERT & MEETING REPORT	156
APPENDIX C: DISCLOSURE ADVERT & MEETING REPORT	166
APPENDIX D: CERTIFICATE OF INCORPORATION	172
APPENDIX E: CERTIFICATE OF TITLE	176
APPENDIX F: CHANGE OF LAND USE	179
APPENDIX F: COPPER PROCESSING PLANT /PROCESS LAYOUT	180
APPENDIX G: WATER, NOISE AND AIR QUALITY REPORT	187
ABBREVIATIONS, NOMENCLATURE & ACRONYMS	187
EXECUTIVE SUMMARY	188
<i>Project Background</i>	188

Location 188

Sampling Criteria	188
Air Quality, Noise, and Dust	188
Water quality	189
1. INTRODUCTION.....	190
1.1 Project Background.....	190
1.1.1 Objectives of the study in relation to the overall project	190
1.1.2 Location of the Project	190
1.2 Scope of the Work	191
1.2.1 Study Area	191
1.2.2 Study Aspect	192
1.3 Sampling Methodology	192
1.3.1 Approach to Assessment	192
1.3.2 Consultation.....	193
2. LEGISLATIVE INSTITUTIONAL FRAMEWORK.....	194
THE ENVIRONMENTAL MANAGEMENT ACT, No 12 of 2011.....	194
ENVIRONMENTAL MANAGEMENT (LICENSING) REGULATIONS, STATUTORY INSTRUMENT No. 112 OF 2013	195
IFC STANDARDS ON NOISE	196
3. SAMPLING	197
3.1 Location of the sampling points	197
Air sampling.....	197
Groundwater sampling.....	197
4. RESULTS	198
4.1 Results	198
5. ANALYSIS	200
6. POTENTIAL ENVIRONMENTAL IMPACTS.....	201
7. CONCLUSSIONS.....	202
8. APPENDICES.....	203

LIST OF TABLES

Table 1-1.1: Proposed Plant site coordinates	3
Table 1-1.2: Name and Details of the Project Developer.....	6
Table 1-1.3: Shareholders of the Project.....	7
Table 3.1 Sources of solid waste and disposal during operation	31
Table 3.2 Proposed Site Coordinates	31

<i>Table 6.1 Significance</i>	<i>71</i>
<i>Table 6.2: Positive/Negative Mitigation ratings.....</i>	<i>71</i>
<i>Table 6.3: Impacts on the Bio-Physical Environment (Operational Phase).....</i>	<i>72</i>
<i>Table 6.4: Evaluation of Impacts.....</i>	<i>73</i>
<i>Table 6.5: Summary of Potential Impacts and their Mitigation Measures</i>	<i>76</i>
<i>Table 8-0.1: CML ENVIRONMENTAL MANAGEMENT PLAN</i>	<i>89</i>
<i>Table 8-0.2: CML EMMP.....</i>	<i>92</i>
<i>Table 9-2..1: Monitoring and reporting</i>	<i>102</i>
<i>Table 9-2..2: Monitoring and reporting</i>	<i>104</i>
<i>Table 9-0.3: Monitoring and Reporting Responsibilities</i>	<i>111</i>
<i>Table 11.1: Cost estimates of Reclamation.....</i>	<i>116</i>
<i>Table 12.1: Emergency Response Plan</i>	<i>120</i>

LIST OF FIGURES

<i>Figure 1-1: Process flow Diagram.....</i>	<i>3</i>
<i>Figure 3-2: Location Map of the proposed Copper Processing facility.....</i>	<i>33</i>

Acronyms and Abbreviations

Abbreviation	Definition
CBD	Convention on Biological Diversity
CSR	Corporate Social Responsibility
ECZ	Environmental Council of Zambia
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EP	Equator Principles
ESEC	Environmental Science and Engineering Consultant
FRA	Food Reserve Agency
GRZ	Government of the Republic of Zambia
GSD	Geological Survey Department
HIV/AIDS	Human Immuno Virus/Acquired Immuno Deficiency Syndrome
HSE	Health Safety and Environment
IAP	Interested and Affected Parties
LWSC	Lukanga Water Supply and Sanitation Company
masl	metres above sea level
MTC	Mumbwa Town Council
NIPA	National Institute for Public Administration
NRDC	Natural Resources Development College
NWASCO	National Water Supply and Sanitation Council
CML	Cedars Minerals Limited
SHE	Safety Health and Environment
SI	Statutory Instrument
STIs	Sexually Transmitted Infections
TLV	Threshold Limit Value
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USD	United States Dollars
WARMA	Water Resource Management Authority
ZEMA	Zambia Environmental Management Agency
ZSA	Zambia Statistics Agency

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Overview

This document forms the Environmental Impact Statement Report for Cedars Minerals Limited (CML).

Cedars Minerals Limited (CML) known as the Developer, intends to develop a copper processing concentrator and associated facilities in Kitumba area of Mumbwa District in Central Province. CML intends to construct a concentrator to process 300 tons per day of copper ore producing approximately 10 tons of concentrate sourced from the big concession area of Mumbwa district. Cedars Minerals Limited has also engaged a local license owner - Minetech Resources Limited and signed a copper ore supplying agreement with the same company to shall supply up to 300 tons per day of Copper Ores. The proposed plant is expected to have a runtime that will be tied to the availability of the supplied ore resources.

Cedars Minerals Limited (CML) intends to construct the plant on farm No. 11383 in Kitumba area of Mumbwa district. It will ensure environmental sustainability of operations of the plant through preparation of the EIA and therein, an Environmental Management Plan (EMP) as per the Zambian legal requirements.

Scope of the EIA study

To determine the environmental and social implications of the project, an EIA must be undertaken according to the Environmental Management Act (Environmental Impact Assessment) Regulations S.I. No. 28 of 1997.

The EIA study has been carried out following the guidelines and requirements of the Zambia Environmental Management Agency (ZEMA) and the project Terms of Reference (see appendices) which were reviewed by ZEMA and approved. The document encompasses an Environmental Impact Statement (EIS) and an Environmental Management and Monitoring Plan (EMMP).

The study addresses issues surrounding the following aspects of the environment:

- Solid waste management and management of other waste during construction and operation phase;
- Soil contamination during all phases ;
- Air quality and noise ;
- Wastewater quality;
- Occupational health and safety;
- Traffic management and safety
- Flora and Fauna;
- Socio-economic issues including employment and multiplier effects, HIV/AIDS;
- Public health issues including waste management and vector control.

The Environmental Management and Monitoring Plan outlines obligations and responsibilities of the Developer (CML), Contractor and other relevant parties to serve as a management tool in the successful implementation of recommended mitigation measures and subsequent monitoring thereof during all project phases.

Project Location and description

Cedars Minerals Limited proposed copper processing concentrator is located in in Kitumba Area, Chieft Kaindu's chiefdom, on Mumbwa-Kasempa Road, Mumbwa District,

and 45 kilometers southwest of Mumbwa Town. The proposed site is located in Mumbwa District and is a brownfield area accessed by driving 45 kilometers southwest of Mumbwa Town on the D181 dirt road towards Kasempa and covers an area of 94 hectares.

The built-up environment near the project constitutes;

- Kitumba Community School and staff houses within 3.3km radius from the project site
- Sugar loaf shopping complex is constructed approximately 3.5 km from the project site
- Kitumba Correctional Facility approximately 6km from the site
- Kitumba Rural Health Post approximately 6km from the project site
- Kafue National Park is approximately 21.5km from the project site.

The proposed plant will be constructed in 2023 and once done, operational will involve procurement of the copper pre which will be processed to make copper concentrate

The concentrator will be designed to process 300 tons per day of copper ore producing approximately 10 tons of concentrate. The main components of the proposed facility are Milling, Flotation and concentrate dewatering and storage.

There are nine (9) unit operations involved in the processing copper are itemized below;

- Crusher
- Ball Mill
- Water Reservoir Facilities
- Ore Stockpile Area
- Conveyor Belt
- Lime-Water Mixing Tank
- Neutralization Tank
- Weighbridge
- Tailings Storage Facility (TFS)
- Pollution Control Dam (PCD)

The proposed process operations of the plant are:

- Crushing of copper-bearing material;
- floatation

Project Objectives

The objective of the project is to develop a copper processing concentrator and associated facilities in Kitumba area of Mumbwa District in Central Province. The concentrator will be designed to process 300 tons per day of copper ore producing approximately 10 tons of concentrate.

Other objectives and benefits of the project are as follows: -

- To contribute to reduction of public demand copper concentrate in the nation as a whole.
- Contribute to national Growth Domestic Product (GDP) by enhancing infrastructural development in Zambia;
- Provide employment opportunities for skilled, semi-skilled and casual workers through direct and indirect job opportunities.

- Contribute revenue to the Government and the Local Authority through payment of corporate taxes, rates and personal levy; and
- Contribute to reduction of poverty levels in Mumbwa District through people employment.

Life Span

The plant is expected to have a lifespan that will last as long as possible within the period of the lease remains relevant to the area. However, processing plants of that nature are expected to last over **25 years** as long as the market remains available for the product.

Project Investment Cost

The cost of the project is estimated at **US\$ 3,500,000** with its implementation expected to commence in the year 2023 or upon acquisition of necessary permits from ZEMA and other Authorizing Agencies.

Legal Framework

In accordance with the **Zambian Environmental Laws**, the Copper processing facility falls under the Second Schedule; regulation 7 (2) of the Environmental Impact Assessment regulations, statutory instrument No. 28 of 1997 and listed under the category of **Mining: mineral processing**. The plant has potential adverse environmental impacts that are generally site-specific, and could be readily addressed through mitigation measures. Accordingly, the Zambia Environmental Management Agency (ZEMA) is mandated to evaluate and assess the EIA report and decide whether to approve or disapprove the facility.

Approach and Methodology

ESEC LTD was the Consultant in the Social and Environmental Assessment of the proposed construction of the plant. The information generated during the various specialist investigations was continuously reviewed and presented and incorporated during the write-up of the document. .

ESEC LTD used a well-established methodology in assessing the impacts and benefits associated with the project. The methodology, as discussed in the main body of the report, assists in ensuring an objective assessment and clearly indicates the criteria used during the EIA process. With the said methodology, decision making is facilitated and subjectivity prevented in order to ensure an impartial reflection and assessment of the project.

Baseline Conditions

To describe the existing environment, appropriate standard methodologies were used. These included undertaking inventory of physical and biological environments, conducting interviews with stakeholders and reviewing of relevant literature. Information on names of geographical features were checked from the maps and confirmed by interviewing the project proponents who were conversant with the area and specific details. The inventory of the existing physical and biological environment such as vegetation in the proposed project site focused on quality, quantity, density, and distribution. The mapping of the existing surrounding buildings was undertaken to map out the surroundings of the project areas in order to determine the location of the proposed development in relation to any existing

critical installations and developments that would be affected by the project. In doing so, the existing environment was categorized into physical, social, and biological environments.

The project site specifically is a vegetative cover, predominantly the Vegetation within the proposed licence area is typical of the vegetation cover Mumbwa and Northwestern province. Common vegetation species in the licence area include the *Isobertinia angolensis* (mupopa), *Brachystegia floribunda* (musuba), *B. longifolia* (musamba) and *B. wangermeeana* (musamba), and the *dipterocarp Marquesia macroura* (muvuka). The proposed plant site has no endangered flora or fauna species. None of the IUCN Red List of threatened fauna species was recorded at the project site.

The project area is not serviced by any water supply company and there will be boreholes sunk at the site. Water supply will be from the drilled boreholes and sanitation will be by proposed sewer line into septic tanks.

The climate in the area is typical of the Central African Plateau whose annual pattern of weather is largely determined by the movement of the Inter-Tropical Convergence Zone (ITCZ). Available data indicates that Mumbwa District has two distinct seasons that characterize the climate of the Project Area: The wet season extending from October to April, and the dry season from April to September. July is usually the coldest month and October the hottest month. The average temperature in Mumbwa is about 20°C throughout the year.

The terrain features shallow valleys and mild hills, with a very gentle north-south slope dipping towards Southern side of the project site even though the site appears almost flat to the human eye.

The general atmospheric air quality and noise conditions of the project area are normal to high and typical of an agricultural area.

Alternatives Considered

Field visits undertaken during the course of study assisted the Consultant team to consider available alternatives to the plant site.

The following alternatives were considered: -

- **Project need alternative:** The shareholders of CML have been motivated to construct the copper processing plant to make profit for them by selling finished the copper concentrate both locally and internationally. The increasing demand for copper in Zambia and other countries, the availability of raw materials (copper ore etc) in Mumbwa has created a conducive business environment. The proposed project will help Zambia meet the demand for copper product as well as help reduce importation of the copper products and subsequent reduction of local prices.
- **Site alternatives:** Two alternative site localities were evaluated using the following criteria; Land Acquisition, Resettlement and Compensation, Market and Infrastructure Accessibility during the Scoping Phase of the Environmental Impact Assessment. The alternatives as follows:

Alternative A: To Use the Existing Site in Mumbwa District

The site in Mumbwa District has all the land acquisition papers put in place. Mumbwa District was earmarked for Industrialization especially manufacturing & agro – Processing. There are no settlers on this land and moreover, it is close to the

source of raw materials (copper ore) and easily accessible by a good road (Mumbwa-Kasempa Road) located in an area with small-scale copper mines and commercial farming blocks where there is easy access to copper ore supply. This is in line with the National Development Plan

Alternative B: Source a Land Parcel in elsewhere

This alternative requires sourcing another land parcel though discussions with local authorities. It could involve resettlement and compensation of project affected persons (PAPs). Moreover, access roads will have to be constructed.

- **Water Supply alternative**

The use of bore hole for water supply was analyzed against connecting to a local water supply utility company and buying of disposable water bottles for domestic use. The use of a borehole was preferred for the project operations and domestic use as an alternative which seemed to be cheaper and appropriate

- **Sewerage Management:** Three options for sewerage and waste water treatment have been considered.

Option 1 requires that the sewage water be discharged to the municipal sewage plant. This option will require that the plant sewer system be connected to Mumbwa Town Council sewage system which is nearer than Mumbwa Town Council. This area has no council sewer system yet.

Option 2 is the preferred option in which a sewer package (septic tanks and effluent retention ponds) that would be installed for the office complex and change house, with the effluent being pumped out and discharged into the council sewer ponds on licensed arrangement. **This option was considered best fit.**

Option 3 would be to discharge the sewage effluent from the plant to the nearby streams as it would contain nutrients (nitrate and phosphate) that would nourish the riverine system and hence contaminate water and cause harm to the eco-system.

- **Waste Management alternatives:** Two option of using the waste bin was analyzed against using a skip bin. The first option meant that the company needed to buy many waste bins, which have a limited holding capacity. The second option was opted as the skip bin has a huge carrying capacity.
- **Power alternatives:** The principal source of electricity during operational phase of the project will be hydro-power energy to be sourced from a nearby ZESCO main which is found within reach of the project site. The ZESCO main was picked as a major source of power as it provides the clean and less costly power alternative which is also environmentally friendly.
- **Raw Materials alternatives:** During the construction phase the material alternatives where to either to use Clay bricks, pre- fabricated materials, concrete blocks. The proponent opted to use concrete block, concrete for foundations, steel beams, and steel fortified structures. This is for the mere reason of the strength factor, natural appeal and the longevity of the structure built from such materials. During the operation phase, the primary raw material for the concentrator project is mainly the copper ore, reagents and mills will be used during the processing.

The alternatives for raw materials were evaluated using the following criteria;

- Technology to be used

- Availability of the raw material
- Prices
- Market
- Accessibility during the Scoping Phase of the Environmental Impact Assessment

Potential Socio and Environmental Impacts

The main issues arising during construction and operational phase include gaseous and dust emissions. The Developer is responsible to take appropriate measures to ensure occupational health and safety for all persons in the proposed plant as well as the safety and comfort of surrounding communities directly affected by operational activities.

Negative impacts

- Deteriorating quality of air due to gaseous and dust emissions. ;
- Solid waste generation;
- Occupational health and Safety in relation to work environment;
- Direct impact on localized soil e.g. soil contamination during operations;
- Generation of sewage;
- Oil effluent Impact on ground water;
- Noise pollution due to use of machinery during operations;

Positive impacts

- Employment opportunities for people of Mumbwa and Zambia at large;
- Revenue for Government through payment of taxes;;
- Improved social interaction;
- Fulfilling the need for copper concentrate in Zambia;
- Multiplier effects in related service and goods sectors;
- Empowerment of small scale miners.

Environmental Management and Monitoring

The study has proposed an Environmental Management and Monitoring Plan (EMP) to address the management of the identified negative impacts associated with the plant. The plan consists the following:-

- Implementing the Impacts Mitigation Plan;
- Monitoring the implementation of the EMP; and
- Institutional Framework for Monitoring, Reporting and Supervision of EMP.

Environmental monitoring and enforcement are stated along with the output from such monitoring activities. Monitoring responsibilities are specified for the responsible authorities (CML).

Key parameters to monitor during operation of the project will include:

- Sewage/ effluent quality;
- Emissions from plant ;
- Dust from the feeders/storage section;
- Solid waste storage, collection and disposal;
- Emergency Preparedness (e.g fire preparedness and maintenance of fire equipment).
- Worker safety.

Conclusion

The construction of the Copper processing plant will undoubtedly bring economic development. This undertaking is on a partially cleared area and most of the environmental impacts during the operational phase of the project will be positive and the following are among the notable ones: -

- Provide direct employment opportunities for the skilled, semi-skilled and casual workers ;
- Empowerment to small scale miners
- Contributing to supply of affordable high quality copper concentrate.

Declaration of Authenticity

Cedars Minerals Limited (CML) certifies and declares that the information presented in this Environmental Impact Statement (EIS) is both factual and accurate. This EIS conforms to the requirements of the Environmental Impact Assessment Regulations, SI 28 of 1997 with regard to the development of Environmental Management Plans.

For and on behalf of the **CEDARS minerals Limited, Zambia.**

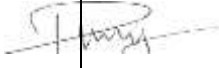

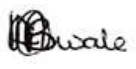

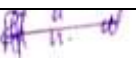
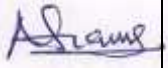


Mr. Julian Liu

Director

Cedars Minerals Limited

EIA STUDY TEAM

EIA Study Project Team					
No.	Name	Qualification	Position	Role	Signature
1	Patson Zulu	<ul style="list-style-type: none"> Bachelor of Science (Chemistry), University of Zambia, 1980-85. Postgraduate certificates, in General and Hazardous Waste Management, Environment and Technology Assessment, Environmental Conservation and Preservation, Environmental Law Enforcement and Litigation, Cleaner Industrial Production, Process Engineering 	Team Leader	Coordination of EIA activities and EIS report writing.	
2	Abiud Banda	<ul style="list-style-type: none"> Masters of Science in Geo-Information Science and Earth Observation, University of Zambia, South Africa, 2017-2019 Bachelor of Engineering (Environmental), Copperbelt University, 2015 Environmental Impact Assessment Procedures, ZEMA, 	Environmental Engineer – Reporting Water Resources Specialist and Air Quality Expert	Critical analysis of project components in relation to existing environmental setting; report writing Assessment of water resources and quality and Air quality assessment / air dispersion modelling	
3	Bwalya L. Mwale	<ul style="list-style-type: none"> Bachelor of Engineering (Environmental), Copperbelt University, 2018 	Solid waste Management, Energy and the environment Expert	Analysis of best options for solid waste at the mine Assessment of waste water, and sewage management Assessment of manganese mining and energy generation in relation to the environment	
4	Alice Muyanga	<ul style="list-style-type: none"> BSc (Wood Science and Technology - Forest Ecology), Copperbelt University, 2016. 	Ecologist	<ul style="list-style-type: none"> Soil characterisation soil characteristics- soil texture, moisture holding capacity, soil fertility in terms of NPK and porosity 	
5	Ernest Mwape	<ul style="list-style-type: none"> MSc (Agriculture Economics); BA (Economics/Statistics) 	Social Science Expert	<ul style="list-style-type: none"> Socio-economic surveys Social impact assessment Environmental and Social Sustainability 	
6	Pride F Katele	<ul style="list-style-type: none"> BEng(Mining Engineering), Copperbelt University, 2018 	Mining Engineer	<ul style="list-style-type: none"> interpretation of mining designs and processes proper siting of the project and its components 	
7	Siame Ndanji	<ul style="list-style-type: none"> Bachelor of Mineral Science 	Geology /Hydrology	<ul style="list-style-type: none"> Assessed the geology /hydrology and possibility of successful copper processing activities of the area 	

NON TECHNICAL SUMMARY

NON TECHNICAL SUMMARY

Cedars Minerals Limited is a Zambian registered company incorporated on 16th February, 2022. CML intends to construct a concentrator to process 300 tons per day of copper ore sourced from the big concession area of Mumbwa district. Cedars Minerals Limited has also engaged a local license owner – Minetech Resources Limited and signed a copper ore supplying agreement with the same company to shall supply up to 300 tons per day of Copper Ore.

The proposed plant will be constructed in 2022 and once operational will involve procurement of the copper ore which will be processed to make copper concentrate.

The total cost of investment is estimated at **US\$ 3,500,000.00** with its implementation expected to commence upon acquisition of necessary permits from ZEMA and other authorizing agencies. The project is expected to have a lifespan that will last as long as possible. However, plant of that nature is expected to last over **25 years**.

The positive impacts of the project will include employment opportunities due to construction and operation of the plant, improved aesthetics of the area, contribute to government revenue, improve social interaction and fulfilling the need for affordable high quality processed copper in Zambia

The main issues arising during construction and operations include gaseous and dust emissions, noise pollution etc. The Developer shall be responsible for providing adequate sanitation for workers and ensuring proper measures for the management of solid and liquid waste products such as garbage and building rubble. Operational raw materials shall be sourced, stored, and used according to appropriate procedures. The Developer shall be responsible to take appropriate measures to ensure occupational health and safety for all persons in the proposed plant as well as the safety and comfort of surrounding communities directly affected by proposed plant activities.

The Copper Processing Plant will undoubtedly bring economic development. This undertaking will involve clearing of the area and most of the environmental impacts during the construction and operational phase of the project will be monitored and prevented. The following are among the notable ones: -

- Provide direct employment opportunities for the skilled, semi-skilled and casual workers during the all phases;
- Empowerment to the small scale miners
- Contributing to supply of affordable high quality processed copper.

NON TECHNICAL SUMMARY (Kaonde-Ila)

Cedars Minerals Limited ke company imo yanembeshiwa muno mu Zambia pa juba ja 16 February, 2022. Ino company yasaka naku kushimika kikulwa nangwa processing plant pa kizungu kya kuwamisha mabwe yabunonshi ya copper kufikila 300 tons pajuba jimo kufuma ku mugodi wamukatampe kuno kuno Mumbwa district.

Cedars Minerals Limited kabiji yaswa kuuba busulu ne company yamuno yitwa Minetech Resources Limited yauvwangana kupana mabwe yafika ku 300 tons pajuba.

Ino plant nangwa kiikulwa kikashimikiwa mu mwaka wa 2022. Panyuma yakupwisha kino kikulwa kicate ndeka kupota mabwe yabunonshi . Mali yakebewa yakufilikila ku US\$1,000,000=00 nemingilo ikatendeka panyuma yaku nembesha byonse bikebwa ne jibumba ja ZEMA ne mabumba yakwabo yatala paino miingilo .Tuna kuketekela uno mutanchi kwikala myaka yavula kufikila ku 40 years kulingana na bilengwa na lesa .

Kuwama kwaino plant ,kukalenga bantu kutana nkito namambo yakushimika bikulwa byapusana pusana, nabantu bakengila pakino kikulwa kabiji kikaleta mali kwikafulumende mukupitila mumisonko yapusanapusana .

Ino mingilo ilenga kutamisha mweela, lukungu kabiji nekyongo mukumona kubamba bino bintu kechi binakukukatazha bantu , bakapana byakwiingijilamo nebyakwingisha kabiji nekumona kwamba mba yonse malabishi yamema nebwabwabo binakutaiwa mwalinga kutaiwa nekulondela mafunde .Kabiji bakamona kwamba bonse bamingilo bena kwibatayako mana sana mukumona pabumi bwabo nebonse baji muminzhi iji kipi kipi.

Kino kikulwa kikaleta mali kabiji mphunzha ikatooka namambo yakuwamya pakwibakila cino cikulwa . Bikatampe bikaletwa neino mingilo byobino:

- kikaleta mingilo kubonse batanga ne babula kutanga kupitila mubisela byapusana .
- kukwasha bekalakyalo baji mubusulu bwamabwe yabunonshi.
- mukupana buwame kabiji kupana yano mabwe mitengo yawama

1

INTRODUCTION

1. INTRODUCTION

1.1 Proposed Background

This document is the Environmental Impact Statement Report for Cedars Minerals Limited. Cedars Minerals Limited is a Zambian registered company incorporated on 16th February, 2022. CML intends to construct a concentrator to process 300 tons per day of copper ore sourced from the big concession area of Mumbwa district. Cedars Minerals Limited has also engaged a local license owner – Minetech Resources Limited and signed a copper ore supplying agreement with the same company to shall supply up to 300 tons per day of Copper Ores. The main components of the proposed facility are Milling, Flotation and concentrate dewatering and storage.

There are nine (9) unit operations involved in the processing copper are itemized below;

- Crusher
- Ball Mill
- Water Reservoir Facilities
- Ore Stockpile Area
- Conveyor Belt
- Lime-Water Mixing Tank
- Neutralization Tank
- Weighbridge
- Tailings Storage Facility (TFS)
- Pollution Control Dam (PCD)

CML will ensure environmental sustainability of operations of the plant through preparation of the EIA and therein, an Environmental Management Plan (EMP) as per the Zambian legal requirements.

In accordance with the Zambian Environmental Laws, the Copper processing facility falls under the Second Schedule; regulation 7 (2) of the Environmental Impact Assessment regulations, statutory instrument No. 28 of 1997 and listed under the category of **Mining: mineral processing**. The facility has potential adverse environmental impacts that are generally site-specific, and could be readily addressed through mitigation measures. This EIS report has therefore been prepared in accordance with section 29 of the Environmental Management Act No. 12 of 2011 that requires the presentation of the findings of the EIA study and identifies both positive and negative impacts of the project together with recommendations to mitigate potential negative impacts and enhance the benefits.

1.2 Project Justification/Rationale

The shareholders of CML have been motivated to construct the Copper Processing Plant to make profit for them by selling processed copper locally and internationally. The increasing demand for Copper in Zambia and globally and the availability of raw materials (copper ore) in Mumbwa has created a conducive business environment.

The proposed plant will help Zambia meet the demand for finished Copper product and

subsequent reduction of local prices.

1.3 Project Description

CML intends to develop a copper processing concentrator and associated facilities in Kitumba area of Mumbwa District in Central Province. The concentrator will be designed to process 300 tons per day of copper ore producing approximately 10 tons of concentrate.

The Developer will operate the plant as soon as construction works are completed. The reason for the project is to locally produce high grade copper concentrates for both the local and export markets from readily available feed stock sources. The three-stage process copper plant will be built from local materials for the first two process stages.

The major components and supporting facilities of the proposed project will include:

- Crusher
- Ball Mill
- Water Reservoir Facilities
- Copper-containing material stockpile area
- Conveyor Belt
- Lime-Water Mixing Tank
- Neutralization Tank
- Weighbridge
- Tailings Storage Facility (TFS)
- Pollution Control Dam (PCD)

The proposed process operations of the plant are:

- Crushing of copper-bearing material;
- floatation

Ore from the stock pile will be loaded into a bin using a front-end loader. The bin will feed a crusher by conveyor belt. CML plans to use the Jaw Crushers to reduce the size of ore rocks into smaller sized pieces for feeding into the process stream. CML intends to use the eccentric overhead style Jaw Crusher with the moving swing jaw is suspended on the eccentric shaft with heavy-duty double roll spherical roller bearings. The swing jaw undergoes two types of motion: one is a swing motion toward the opposite chamber side (called a stationary jaw die due to the action of a toggle plate), and the second is a vertical movement due to the rotation of the eccentric. These combined motions compress and push the material through the crushing chamber at a predetermined size suitable for the process.

The process will use the Ball Mill to further crush the ore to the required particle size for further processing in the crushed ore. A ball mill is a type of grinder used to grind, blend and sometimes for mixing of materials for use in mineral dressing processes. It works on the principle of impact and attrition: size reduction is done by impact as the balls drop from near the top of the shell. A ball mill consists of a hollow cylindrical shell rotating about its axis. The axis of the shell may be either horizontal or at a small angle to the horizontal. It is partially filled with balls. The grinding media is the balls, which may be made of steel (chrome steel) or stainless steel. The inner surface of the cylindrical shell is usually lined

with an abrasion-resistant material such as manganese steel.

The product from the ball mill will use the classifier for the classification of the material before being sent to the stirred tanks and eventually flotation. In the stirred tanks, the material will be mixed or blended then to the flotation circuit.

The flotation is a process for selectively separating hydrophobic materials from hydrophilic environments and is used in mineral processing industries. The flotation process has improved the recovery of valuable minerals, such as copper-bearing minerals and has allowed the economic recovery of valuable metals from the ore. In the flotation circuit, the ground ore is mixed with water to form a slurry, and the copper in the ore is rendered hydrophobic by the addition of a surfactant or collector chemical. This slurry (more properly called the pulp) of hydrophobic particles and hydrophilic particles is then introduced to tanks known as flotation cells that are aerated to produce bubbles. The hydrophobic particles attach to the air bubbles, which rise to the surface, forming froth. The froth is removed from the cell, producing a copper concentrate recovered for the drying process. Froth flotation efficiency is determined by a series of probabilities: those of particle–bubble contact, particle–bubble attachment, transport between the pulp and the froth, and froth collection into the product launder.

The concentrates produced will be allowed to air dry to an appropriate moisture content required by the buyers before shipping it out.

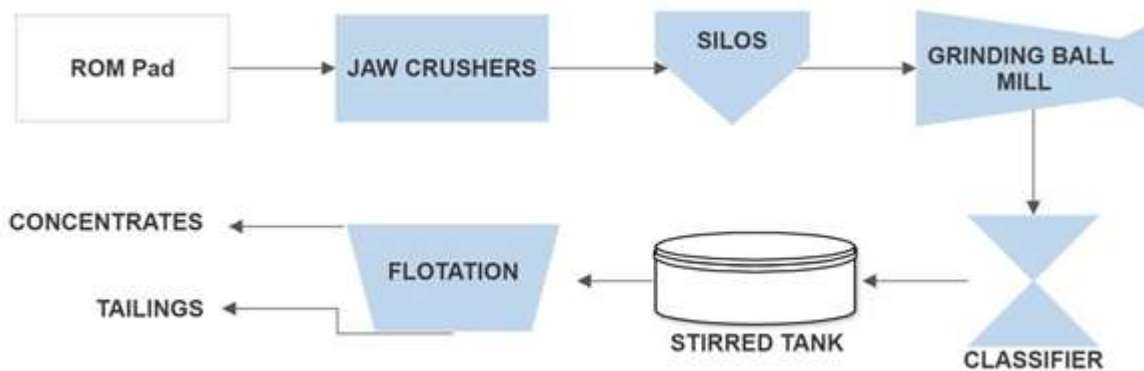


Figure 1-1: Process flow Diagram

1.4 Proposed Project Location

The proposed copper processing concentrator is located in in Kitumba Area, Chief Kaindu’s chiefdom, on Mumbwa-Kasempa Road, Mumbwa District, and 45 kilometers southwest of Mumbwa Town. The proposed site is located in Mumbwa District and is a brownfield area accessed by driving 45 kilometers southwest of Mumbwa Town on the D181 dirt road towards Kasempa and covers an area of **94** hectares.

The following are the coordinates of the plant:

Table 1.1: Proposed Plant site coordinates

TABLE 1.3: CML SITE COORDINATES
--

Beacon No.	Description	Eastings	Northings
1	Corner point A	E-483298.852	N-8369996.933
2	Corner point B	E-484164.854	N-8370516.678
3	Corner point C	E-484426.532	N-8369396.776
4	Corner point D	E-483453.211	N-8369228.321



1.5 Material Requirements

The proposed plant requires the following raw materials; Copper ore, sulphuric acid, raffinate, Water, Electricity and Diesel in operation phase. The proposed site will have a borehole, and water will be pumped from it. Energy in form of power will be supplied by ZESCO Limited for the entire plant and also Generator Sets which will be on standby to be used during any emergencies.

1.6 Estimated Cost and Start Date

The total cost of the **proposed plant** is estimated at **US\$ 3,500,000.00** with EMP implementation expected to commence upon acquisition of necessary permits from ZEMA and other authorizing agencies. The proposed plant is expected to have a lifespan that will last as long as possible within the period of the lease remains relevant to the area. However, processing plants of that nature are expected to last over 40 years as long as the market remains available for the product.

1.7 Project Objectives

The construct a copper processing concentrator aimed at concentrating copper ore to concentrates in Chief Kaindu's Kitumba Area of Mumbwa, located Farm No. 11383 on Mumbwa- Kasempa Road, Kaindu area, Mumbwa district.

Other objectives and benefits of the plant are as follows: -

- Install primary and secondary crushers and Ball Mills
- Produce upwards of a total of 10 tons per day of copper concentrates from the

installed copper processing plant.

- Generate an added revenue stream to the company's profile through evacuation and sale of the
- Copper concentrate to other mining companies.
- Contribute to sustainable national development through the added generation of copper concentrates from mining waste products sources.
- To contribute to national Growth Domestic Product (GDP) by enhancing the economic activities of the area and subsequently infrastructural development in Zambia;
- To provide employment opportunities for the skilled, semi-skilled and casual workers through direct and indirect job opportunities at every phase of the project.
- To contribute revenue to the Government and the Local Authority (Mumbwa Town council) through payment of corporate taxes, rates and personal levy; and
- To satisfy customers' needs and wants for high quality copper concentrate
- Contribute to national Growth Domestic Product (GDP) by enhancing infrastructural development in Mumbwa, Zambia;
- Provide employment opportunities for skilled, semi-skilled, and casual workers through direct and indirect job opportunities.
- Contribute to reduction of poverty levels in Mumbwa District through people employment.

1.8 Legal and Administrative Framework

The document has been prepared in line with the requirements of the Zambian Environmental Management Act, 2011 and its subsidiary legislation, the Environmental Impact Assessment Regulations, 1997 (Statutory Instrument No.28 of 1997). It also refers to the **Factory Act, Local Government Act, of 2019, the Mines and Minerals Development Act, 2015**, the Water Resource Management Act, 2011, the Public Roads Act, 2002 and other applicable legislations and regulations. The administrative framework within which the proposed project will be implemented will include Zambia Environmental Management Agency (ZEMA), the Mumbwa Town Council, Ministry of Housing and Infrastructure Development, Water Resource Management Authority (WARMA) and other regulatory and government agencies.

In accordance with the Zambian Environmental Laws, the proposed project falls under the Second Schedule; regulation 7 (1) of the Environmental Impact Assessment regulations, statutory instrument No. 28 of 1997 and listed under the category of **Mining: mineral processing**. This EIA, has therefore been prepared in accordance with section 29 of the Environmental Management Act No. 12 of 2011 that requires the presentation of the findings of the EIA study and identifies both positive and negative impacts of the project together with recommendations to mitigate potential negative impacts and enhance the benefits.

1.9 Need for the Environmental Impact Assessment (EIA)

The current economic development trends worldwide have recognized the need to take environmental considerations into account. This is to ensure a sustainable management of the world's diverse but delicate and diminishing resources and is made using the processes and activities encompassed under the tool of Environmental Impact and Assessment, (EIA).

The process begins with the development of Draft Terms of References (TORs) by the Proponent in conjunction with the appointed EIA Consulting Team for the proposed

development. Thereafter, a Scoping Meeting is called by the Proponents or Developer, in order to provide the public with an opportunity to participate in the environmental assessment process.

The input from the various stakeholders and potential Interested and Affected parties (IAPs) consolidates the Draft TORs and Scoping Report which are now submitted to ZEMA. The approved TORs by ZEMA provide a basis for conducting the detailed Environmental Impact Assessment (EIA). After the assessment, an EIA report is produced and submitted to ZEMA.

1.10 ESEC LTD and EIA Terms of Reference

ESEC LTD was recruited by the Developer (CML) to provide environmental management consultancy and advisory services. The Consultants then liaised with all the stakeholders by engaging all the interested and affected parties (IAPs) and incorporating their views and concerns into the EIA process, to develop the TORs. The firm undertook and facilitated the undertaking of specialized studies related to the assessment. This EIS is the output.

1.11 Overview on CML

Cedars Minerals Limited is a Zambian registered company incorporated on 16th February, 2022. The success of CML lies in its commitment to investing in the best and most qualified human resources, hard work, ambition, integrity, accountability and its pragmatic approach to doing business. Cedars has made large investments to ensure its sustained commercial footprint in Africa. Shareholding of CML is as presented in Table 1-1.2 and 1-1-3.

Table 1-1.2: Name and Details of the Project Developer

Table 1.1:	
Name of Project Developer	Cedars Minerals Limited
Address and contact details	Address: Plot No. 10652 Kasanda Area, P.O. Box 81347 Kabwe. Mr. Julian Liu Director Tel No.: +260 97 7968465 Email: Julianliu32@gmail.com
Ownership	100%

Table 1-1.3: Shareholders of the Project

Particulars of Shareholder	Nationality & NRC/Passport No	Share class	Number of Shares held	Percentage Shareholding
HILAL BOURJI	LEBANON 562425/99/3	ORDINARY	2250.00	15
RONY I.CHAMOUN	LEBANON LR2083670	ORDINARY	3750.00	25
MICHEL M. FAHED	LEBANON LR1766736	ORDINARY	3750.00	25
YUYE LIU	CHINESE EG1751830	ORDINARY	3750.00	25
ALAA BOURJI	IVOIRIENNE 20AE67691	ORDINARY	1500	10
Total			15,000.00	100 %

1.12 Approach and Methodology

An environmental and socio-economic survey was conducted to ascertain environmental and socio-economic characteristics of the baseline environment and the possible impacts of the facility. Data for both the impact assessment and the baseline survey were collected using a combination of tools aimed at drawing out both qualitative and quantitative information using multiple but complementary public opinion survey. Discussions were held within the site with various stakeholders.

1.13 Initial Scoping with public consultation

In line with the Environmental Impact Assessment Regulations of 1997, a scheduled scoping exercise for the proposed construction of the Copper Processing Plant in Mumbwa, was conducted as an initial stage in the EIA study. A **public opinion survey (Scoping) was held on 17th June 2022 at site of Cedars Minerals Limited, the proponents of the project and also the email Julianliu32@gmail.com**. The stakeholders were drawn from Mumbwa Town Council, Kitumba correctional facility and nearby settlers. Prior notices for consultations were given before scoping survey. The project description, potential environmental and socio-economic, mitigation measures, and benefits were presented to stakeholders for their feedback. The public opinion survey provided an opportunity for capturing of any other relevant issues for inclusion in the EIA document. The meeting allowed stakeholders to air their views on all possible environmental and socio economic impacts and best practical mitigation measures. Media prints and comments raised are annexed to the report.

1.14 Desktop study

In order to gain a clear perspective on the environmental and social implications of the proposed project, detailed desktop studies were conducted on reports concentrating on the available data and documents related to the environmental studies. Literature review will include but not limited to:

- Review of the existing environmental information and legislation;
- Review of the Environmental Management Act and its subsidiary legislation and other relevant Acts and international conventions.

1.15 Baseline Studies and Data Collection

To describe the existing environment appropriate standard methodologies were used. These included undertaking inventory of physical and biological environments and reviewing of relevant literature. Information on names of geographical features were checked from the maps and confirmed. The inventory of the existing physical and biological environment such as vegetation in the vicinity of the facility focused on quality, density, and distribution. The mapping of the area was undertaken to map out the surroundings of the project areas in order to determine the location of the plant in relation to any existing installations that are affected by the plant. In doing so, the existing environment was categorized into physical and biological environment. After data collection and analysis, preliminary description of bio-physical and socioeconomic environment within and around study area was done.

The EIA involved: -

- **Desk study** and review of the available background information about the project proponent, the project area and its nature., the environmental and legislation information, literature review concerning the project site, collected secondary data, analyzed survey plans, interviews with owners who provided valuable information associated to the project;
- **Several field trips** and surveys were conducted by the study team at the site and surroundings to gather information on the existing environment including topography, geology and soils, fauna and flora, population and settlement, economic activities and existing physical infrastructure relevant to the environmental study. Collected primary data and carried out ground truthing on the information provided to the consultant and triangulated important information pointed out during literature review in order to have an in-depth understanding of the current status of the station and its surrounding environment;
- **Evaluating the objective of the project** against the current environmental status and project conceptualization; Identifying all potential social-economic, positive and negative impacts that may arise as a result of regularizing, normalizing and continuous operation of the copper processing plant and their impacts on the biophysical environment, their magnitude and significance;
- **Prescribing the mitigation measures** to all the identified potential negative impacts; outlining a sustainable Environmental Management Plan (EMP) for the project.

2

POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK

2. LEGISLATIVE AND ADMINISTRATIVE FRAMEWORK

This section outlines the legal and administrative framework within which the project will be implemented. It outlines the relevant national legislations and international agreements.

2.1 Environmental Policy/Plans/strategies

2.1.1 National Policy on Environment (NPE), 2009

It is the principal policy that governs environmental management in Zambia to safeguard the environment and sustainable use of natural resources. The Policy expects to achieve increase economic growth that is not detrimental to environment and natural resources. The specific objectives are:

- Promote the sound protection and management of Zambia's environment and natural resources in their entirety, balancing the needs for social and economic development and environmental integrity to the maximum extent possible, while keeping adverse activities to minimum;
- Manage the environment by linking together the activities, interests and perspectives of all groups, including the people, non-governmental organizations (NGOs) and government at both the central and decentralized local levels;
- Accelerate environmentally and economically sustainable growth to improve the health, sustainable livelihoods, income and living conditions of the poor with greater equity and self-reliance;
- Ensure broadly based environmental awareness and commitment to enforce environmental laws and to the promotion of environmental accountability;
- Regulate and enforce environmental laws and build individual and institutional capacity to sustain the environment;
- Promote the development of sustainable industrial and commercial processes having full regard for environmental integrity.

Relevance/Compliance: CML intends to construct the Copper Processing Plant in an environmentally and socially sound manner and operate in line with the country's set regulations environmental protection, which is a focal point of NPE.

2.1.2 National Conservation Strategy (NCS), 1985

The National Conservation Strategy has been the main policy document on the Environment and Natural Resources in Zambia. The objectives of the NCS are as follows:

- To ensure the sustainable use of Zambia's renewable natural resources;
- To maintain the country's biological diversity;
- To maintain essential ecological processes and life-support systems.

The NCS had triggered the enactment of Environmental Protection and Pollution Control Act (EPPCA), a regulatory instrument that cuts across sectors and creation of Environmental Council of Zambia (ECZ) to regulate environmental matters and deal with related issues in 1991. It establishes policies and devises plans and fully integrates conservation into Zambia's social and economic development. It also aims to analyse trends and current issues to better anticipate problems and needs.

Relevance/Compliance: CML will ensure sustainable use of resources as well as make certain that the plant is environmentally friendly. CML will ensure that effluents discharged into the environment should comply with ZEMA standards and that they do not cause pollution in the receiving environment.

2.1.3 National Environmental Action Plan (NEAP), 1994

The National Environmental Action Plan (NEAP) is a comprehensive plan focusing on the identification of environmental issues, analysis of its causes and recommending adequate mitigation measures. The overall objective of NEAP is to integrate environmental concerns into the social & economic development planning process of the country. The three (3) founding principles of NEAP are as follows:

- The right of the citizens to a clean and healthy environment;
- Local community and private sector participation in natural resources management; and
- Obligatory Environmental Impact Assessments (EIAs) of major development projects in all sectors.

Relevance/Compliance: CML will follow the requirements of the Plan and therefore, construct and operate the plant in a manner that will ensure to arrest ground and surface water contamination in the priority areas of the plant.

2.1.4 National HIV and AIDS Strategic Framework (NASF), 2017 – 2021

The National HIV-AIDS Strategic Framework (NASF) 2017-2021, provides an overall strategy for the planning, coordination and implementation of the multi-sectoral national response based on available evidences. The principal goal is to reposition prevention of new HIV infections as the focus of the national multi-sectoral HIV and AIDS response. A great emphasis is laid on scaling up HIV combination prevention services that enable individuals to maintain their HIV negative status as well as improve access to quality treatment and care services. NASF was developed through highly participatory and consultative process and reflects aspirations of the Zambians in their efforts to fight HIV and AIDS epidemic. The framework is designed to support decentralised implementation with meaningful involvement of communities, people living with HIV, Civil Society Organisations (CSOs) and marginalized populations, so as not to leave anyone behind in the response.

Relevance/Compliance: CML will establish adequate mechanism for HIV/AIDS awareness in the project area through consultations amongst affected communities.

2.2 National legislative framework

2.2.1 Environmental Management Act (EMA), 2011

The Zambian Environmental Management Act (EMA), 2011 is the superior Act on matters relating to environmental protection and management. Its superiority is outlined in Section 3 of the Act. The Act sets out a framework for Environmental Impact Assessments (EIA's) as well as renaming the Environmental Council of Zambia (ECZ) as the Zambia Environmental Management Agency (ZEMA), a regulatory Agency mandated to do all such things as are necessary to ensure the sustainable management of natural resources and the protection of the environment, and the prevention and control of pollution.

The Act outlines principles governing environmental management and provides for, among

other things, Environmental Impact Assessment, and regulations relating to environmental assessments. The Act has also spelt out offences relating to failure to prepare and submit an EIA report for projects that require such reports. Projects that require preparation of EIA reports must be approved by ZEMA prior to implementation. Section 29 of the Act specifically states that “a person shall not undertake any project that may have an effect on the environment without the written approval of the Agency, and except in accordance with any conditions imposed in that approval.”

The Environmental Impact Assessment) Regulations, 1997 (Statutory Instrument No. 28 of 1997) specifies the requirements for an EIA and it also set out in its Second Schedule projects for which EIAs are applicable. It provides specific guidelines for conducting environmental impact assessments. The regulations require project developers undertaking projects that may have significant effect on the environment to conduct environmental impact assessment prior to obtaining written approval from ZEMA on implementation of the project. Regulation 3 of the Statutory Instrument specifically states that “A developer shall not implement a project for which a project brief or an environmental impact statement is required under these Regulations, unless the project brief or an environmental impact assessment has been concluded in accordance with these Regulations”.

The Environmental Management (Environmental Impact Assessment) Regulations, 1997 (Statutory Instrument No. 28 of 1997) specifies the requirements for an EIA and it also sets out in its Second Schedule projects for which EIAs are applicable. It provides specific guidelines for conducting environmental impact assessments and for evaluation of environmental impact statements. The regulations require project developers undertaking projects that may have significant effect on the environment to conduct environmental impact assessment prior to obtaining written approval from ZEMA on implementation of the project. Regulation 3 of the Instrument specifically states that “A developer shall not implement a project for which a project brief or an environmental impact statement is required under these Regulations, unless the project brief or an environmental impact assessment has been concluded in accordance with these Regulations.

Compliance: The Copper processing plant will be operated in accordance with the provisions of the Act and applicable environmental regulations.

A. Environmental Protection and Pollution Control (EPPCA) Act, 1990 (Environmental Impact Assessment) Regulations, SI No. 28 of 1997.

These Regulations provide the main framework under which Environmental Impact Assessments (EIA) are conducted under the supervision of ZEMA that considers and decides to approve or reject projects.

Relevance: - The construction of copper processing plant has social-economic and environmental impacts, hence the relevance of the EIA.

Compliance: The plant will implement the approvals obtained in accordance to these regulations. The proposed copper processing plant will be required to submit an EIS to the ZEMA, and approval from the ZEMA will be required to be implemented in the facility.

B. Statutory Instrument No. 112 of 2013; Part II on Air and Water pollution (Licensing) Regulations.

These Regulations provide for licensing of gaseous emissions to the environment and also provides for statutory discharge limits for respective parameters. The Regulations also provides for issuance of permits, limits, air quality guidelines and classification of effluent discharge to air or water.

Relevance: The plant may produce air pollutants including smoke from the vehicles, dust and plant odors during construction and operation activities.

Compliance: The plant will ensure that only modern equipment with none or fewer emissions are released into the atmosphere. The workers shall further be provided with PPE attire including air masks.

C. Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 Part II- liquid waste discharge

This regulation provides for the licensing of liquid waste discharge limits for respective parameters. Operational stage of the facility may cause contamination of storm water by hydrocarbons; therefore measures have to be put in place to comply with the provisions of this regulation.

Relevance: these regulations are relevant in that the proposed plant facilities (canteens, toilets, bathrooms, tailings) have potential to leak, spill into the environment causing pollution, especially foul smells.

Compliance: The effluents will be monitored to ensure that the foul smell from the effluents is adequately reduced. A proper sewer system is in place. The effluent will be channeled to the Company sewer system within the plant.

D. Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 Part IV Hazardous waste management.

The regulation provides for licensing of solid/liquid hazardous waste management from generation through to disposal and owning of hazardous waste disposal sites. The processing facility will involve the generation of hazardous waste in form of sludge and should be handled in accordance with this regulation.

Relevance: These regulations are relevant in that the operations of the plant will somehow generate hazardous waste whose transportation and disposal requires constant monitoring.

Compliance: All the hazardous waste will be contained because the area will be made of concrete. Any machine oil will be adequately stored in the drums and sold to the recycling companies.

E. The Extended Producer Responsibility (EPR) Statutory Instrument No. 65 of 2018

The SI came into force on 3rd August, 2018 extends the responsibility of the producer of a product or class of products to the post-consumer stage of the product or class of products. It places an obligation on producers of products that have potential to pollute the environment to minimize waste through treatment, reclamation, re-use, recovery or recycling. It regulates the following types of packaging material:

- i. Cartons
- ii. Non-returnable glass bottles
- iii. Non-returnable plastic bottles
- iv. Plastic carrier bags and flat bags below 30 microns
- v. Beverage cans
- vi. Waste oils
- vii. Waste lubricant containers
- viii. Used lead acid batteries
- ix. Pesticides containers/packaging
- x. Chemicals containers/packaging
- xi. Expired chemicals
- xii. Used tyres
- xiii. Near end of life or end of life electrical and electronics
- xiv. Electrical and electronic equipment.

Relevance: These regulations are relevant in that the construction and operations of the proposed plant will involve use of plastic packaging.

Compliance: All the plastic packaging and cartons at the proposed plant shall comply with EPR Regulations.

2.3 Other Related Legal Framework

As required in the preparation of the full environmental impact assessment, in addition to consultation of the Environmental Management Act No. 12 of 2011, consideration of provisions or requirements in the other relevant pieces of legislation is vital to this project. Some of these are listed below:-

2.3.1 Standards Act No.4 of 2017

This provides for standards of quality control for certain commodities and continues the existence of the Zambia Bureau of Standards by re-defining its powers and functions; provide for standardization and quality assurance of products and services through the setting of national standards and provision of conformity assessment services for products and services; to repeal the Standards Act, 1994; and to provide for matters connected with or incidental to the foregoing.

Relevance: The proposed plant will involve installation of tanks, electrical components and other ancillary facilities that are subject for standardization.

Compliance: The developer (CML) will install the components according to the Zambia bureau of standards Specification. Before any material and equipment are taken to the site it shall be ensured that all the inspections and authorizations are obtained from the Zambia Bureau of Standards.

2.3.2 Metrology Act No. 6 of 2017

This is an Act to continue the existence of Zambia Weights and Measures Agency, rename it as the Zambia Metrology Agency and re-define its functions; establish the Board of the Agency and provide for its functions; provide for the designation, keeping and maintenance

of national measurement standards; provide for the use of measurement units of the International System of Units and other units; provide for consumer protection, health, safety and environmental management through legal metrology measures; repeal the Weights and Measures Act, 1994; and provide for matters connected with or incidental, to the foregoing.

Relevance: The proposed plant will involve the use of measurement units of the International System of Units and other units especially during any construction on the plant.

Compliance: The developer (CML) will install the tanks, electrical components and other ancillary facilities according to the Zambia Metrology Agency's Weights and Measures.

2.3.3 National Heritage Conservation Act, 1989

The National Heritage and Conservation Act (NHCA) established the National Heritage and Conservation Commission (NHCC) which is responsible for the conservation of ancient, cultural and natural heritage, relics and objects of aesthetic, historical, pre historical, archeological or scientific interest by preservation, restoration, rehabilitation and reconstruction. The national heritage and conservation commission is responsible for identification and conservation of sites of cultural and historical interest. The commission is also responsible for enforcement of the national heritage Act.

Relevance: The proposed plant being in an area which might have some historical background not known to us requires compliance to this Act.

Compliance: The area is void of any archeological history, in a case where a strange object having cultural significance is found, the developer will ensure that the matter is made known to the National Heritage and Conservation Commission.

2.3.4 Land Act, 1995

The Lands Department in the Ministry of Lands, Natural Resources, and Environmental Protection is the government agency that enforces the provisions of the Land Act. The Act provides for holding of land into categories that include state, local authority and traditional land.

Relevance: The land in question is under state's jurisdiction and as such is governed by the Act.

Compliance: The land in question belongs to CML. The property is registered in the name of the owner of the land.

2.3.5 Local Government Act No.4 2019

This Act provides for an integrated local government system; give effect to the decentralization of functions, responsibilities and local services at all levels of local government; ensure democratic participation in, and control of, decision making by the

people at the local level; revise the function of local authorities; provide for the review of tariffs, charges and fees within area of the local authority; repeal and replace the Local Government Act, 1991.

Relevance: The proposed plant being in the Mumbwa Town Council area, it will require local licensing e.g. fire certificates.

Compliance: All the required certificates will be furthered at the Mumbwa Town Council.

2.3.6 Factories Act, No. 2 of 1966

Enacted in 1967, the Act regulates the conditions of employment in factories and other places of work as regard to the safety, health and welfare of persons employed therein. The Act also provides for the examination and inspection of certain plant and machinery in order to ensure safety.

Relevance: The proposed copper processing plant will house factory equipment and will be operational for 24hrs every day.

Compliance: The developer will ensure that the machinery being used for construction and maintenance are in good working order to avoid any accidents.

2.3.7 The Mines and Minerals Development Act No. 11 of 2015

piece of legislation regulates mining and mineral processing activities in Zambia. Under this Act, a number of Statutory Instruments (SIs) have been issued. The SIs that are relevant to this project are:

- Mining (Mineral Resource Extraction) Regulations (SI No. 119, 1994)
- The Mines and Minerals (Environmental) Regulations (SI No. 29, 1997)
- Mines and Minerals (Environmental Protection Fund) Regulations (SI No. 102, 1998).

Relevance: - These pieces of legislation are relevant to this project because they regulate mining, mineral processing activities and regulate the management of ore dumps which are environmental aspects of this copper processing project.

Compliance - The CML will comply with the provisions of this Act by operating the OB in line with the conditions specified in the Act and its Regulations

2.3.8 Public Health Act, 1995

This Act provides for prevention and suppression of public health hazards. It regulates all matters and activities that are connected to outbreak of diseases. Provisions of the Act are implemented by Councils through licensing and inspections.

Relevance: The facility's activities may affect the health of the workers at the site and the general public, hence the need to adhere to this act.

Compliance: Activities to do with good sanitation, health and safety and general cleanliness will be enhanced throughout the operations of the plant. This will be enhanced by implementing adequate mitigation measures including routine medical check-ups for all the workers on site during all the facility's operational phases.

2.3.9 The Public Health Act (Infected Areas) (Coronavirus Disease 2019)

Regulations, S.I 21 of 2020

This provides for the prevention and suppression of the spread of the Corona virus disease, also known as Covid-19. It regulates all matters and activities that are connected to outbreak of diseases. Provisions of the Act are enforced/ implemented by authorized qualified officers through inspections.

Relevance: - The project site will be required to adhere to all set guidelines and Covid-19 regulations and therefore the Act is relevant.

Compliance: All plant workers and contractors will adhere to all the Covid-19 guidelines and regulations as set by the Government of Zambia

2.3.10 Public Health Act (Corona Virus) Infectious Diseases S.I No. 21 of 2020

This Act declares the Coronavirus Disease 2019 a notifiable infectious disease under section 9 of the Public Health Act, which mandates people to notify relevant authorities whenever a person is suffering from such a disease.

Relevance:- The project site will be required to set up and conduct preliminary tests to detect presence of coronavirus disease among workers.

Compliance: All plant workers and contractors are mandated to notify relevant authorities whenever a person is suffering from such a disease

2.3.11 Water Resources Management Act, 2011

The Act provides for establishment of the Water Resources Management Authority and defines its functions and powers; the management, development, conservation, protection and preservation of the water resource and its ecosystems; the equitable, reasonable and sustainable utilization of the water resource; issues rights to draw or take water for domestic and noncommercial purposes, and ensures that the poor and vulnerable members of the society have an adequate and sustainable source of water free from any charges; create an enabling environment for adaptation to climate change; provide for the constitution, functions and composition of catchment councils, sub-catchment councils and water users associations; provide for international and regional cooperation in an equitable and sustainable utilization of, shared water resources; provide for the domestication and implementation of the basic principles and rules of international law relating to the environment and shared water resources as specified in the treaties, conventions and agreements to which Zambia is a State Party; repeal and replace the Water Act, 1949; and provide for matters connected with, or incidental to, the foregoing.

Relevance: Water abstraction from rivers and underground requires permit from WARMA. Surface run-off and seepage from the proposed pipeline should not contribute to pollution of water resources that may render its use by other stakeholders unsustainable. This legislation is relevant to the project to ensure that measures to prevent pollution to human health and to any water supply bodies are taken into account through provisions of tight leakage control systems.

Compliance: Several permits will be obtained from WARMA such groundwater permits.

2.3.12 Employment Code Act, No. 3 of 2019

An Act to regulate the employment of persons; prohibit discrimination at an undertaking; constitute the Skills and Labour Advisory Committees and provide for their functions; provide for the engagement of persons on contracts of employment and provide for the form and enforcement of the contracts of employment; provide for employment entitlements and other benefits; provide for the protection of wages of employees; provide for the registration of employment agencies; regulate the employment of children and young persons; provide for the welfare of employees at an undertaking; provide for employment policies, procedures and codes in an undertaking; repeal and replace the Employment Act, 1965, the Employment (Special Provisions) Act, 1966, the Employment of Young Persons and Children Act, 1933 and the Minimum Wages and Conditions of Employment Act, 1982; and provide for matters connected with, or incidental to, the foregoing.

Cited Section: Introduction and Title.

Relevance: For the proposed development, this will cover such matters as contracts of work. The proposed project will employ a number of people.

Compliance: The developer will ensure that the employees' conditions of service are humane and that all people that get employed will be employed on the basis of merit and skills and not race, gender or tribe.

2.3.13 Public Roads Act, 2002 (amended in 2006)

The Act provides for establishment of the Road Transport and Safety Agency and its functions; a system of road safety and traffic management; licensing of drivers and motor vehicles; registration of motor vehicles and trailers; compulsory third party insurance of motor vehicles; licensing and control of public service vehicles; promotion of road safety; regulation of road transport between Zambia and other countries with which Zambia has concluded cross-border road transport agreements.

Relevance: All the stages of the facility might lead to disturbance to the normal flow of traffic on the Mumbwa- Kasempa road near the plant area. Hence the need for CML and the Contractor to adhere to this Act.

Compliance: The proponent shall ensure that all the transportation vehicles are registered and being driven by licensed drivers who shall promote road safety.

2.3.14 National Council for Construction Act No. 10 of 2020

An Act provides, among other things, for the promotion, development, and regulation of the construction industry in Zambia, registration of contractors, affiliation to the Council of professional bodies or organizations whose members are engaged in activities related to the construction industry. It also provides for the regulation of the construction industry; repeal the National Council for Construction Act 2003; and provide for matters connected with, or incidental to, the foregoing

Relevance: The Act will be relevant during construction activities the contractor on site shall be required to be registered with the NCC and also all the works are supposed to be

done with great compliance to the best construction practices. Hence the relevance of this Act.

Compliance: The Company shall engage only licensed contractors and ensured that the NCC certificates are all valid.

2.3.15 Electricity Act No. 11 of 2019

The Act seeks to regulate the generation, transmission, distribution and supply of electricity so as to enhance the security and reliability of the supply of electricity; provide for the sale and purchase of electricity within and outside the Republic; facilitate the achievement of the efficient, effective, sustainable development and operation of electricity infrastructure; provide roles and responsibilities of various participants in the electricity sector; provide for a multi-year tariff framework; promote transparency in the identification and allocation of risks, costs and revenues within and between participants in the electricity sector; ensure the protection and safety of consumers of electricity and the public; repeal and replace the electricity Act, 1995; and provide for matters connected with, or incidental to, the foregoing. g. The act states that any person, who, without legal right, cuts, injures or interferes with any apparatus for generating, transmitting or distributing or supply electricity, or maliciously extinguishes or damages any lamp or other electric apparatus provided for the convenience of the public, shall be guilty of any offence.

Relevance/Compliance: the proposed Facility construction components and operations at the site will utilize power from ZESCO and some pass through or intersect a ZESCO power line, hence the Developer shall carry out the work in accordance with this Act.

2.3.16 Forest Act of 2015 and S.I. No 11 of 2018

The Act provides for the establishment and management of National Forests and Local Forests; the conservation and protection of forests and trees; and the licensing and sale of forest produce.

Relevance: The area has a vegetative cover and hence the need to comply with the Act.

Compliance: Indiscriminate cutting of trees within the proposed facility site will be discouraged. Where trees are cut, revegetation programme will be implemented to offset the losses.

2.3.17 Road Traffic Act, 2002

The Act provides for establishment of the Road Transport and Safety Agency and its functions; a system of road safety and traffic management; licensing of drivers and motor vehicles; registration of motor vehicles and trailers; compulsory third party insurance of motor vehicles; licensing and control of public service vehicles; promotion of road safety; regulation of road transport between Zambia and other countries with which Zambia has concluded cross-border road transport agreements.

Relevance: All the stages of the proposed plant might lead to disturbance to the normal flow of traffic on Mumbwa-Kasempa road near the Plant area. Hence the need for CML and the Contractor to adhere to this Act.

Compliance: The proponent shall ensure that all the transportation vehicles are registered and being driven by licensed drivers who shall promote road safety.

2.3.18 Occupational Health and Safety Act, 2010

This Act provides for the establishment of the Occupational Health and Safety Institute and for its functions. It provides for the establishment of health and safety committees at workplaces and for the health, safety and welfare of persons at work. It further provides for, among other provisions, the protection of persons, other than persons at work, against risks to health or safety arising from, or in connection with, the activities of persons at work.

Relevance: The proposed plant works will have occupational health and safety risks such as exposing workers on site to high levels of dust, lifting heavy equipment, trip and slide hazards etc.

Compliance: The Company will ensure that all the necessary safety signs are displayed around the site, within the site and safety attires are worn always by the employees. Safety awareness talks every morning by the chief safety officer will also be conducted.

2.4 International Convention and Agreements

This subsection summarizes some of the international conventions and agreements to which the Zambian Government is a party and which are applicable to the project. The agreements and protocols impose obligations on Zambia to address issues or topics included in these documents.

2.4.1 Convention on Biological Diversity (ratified in 1993)

This convention requires Parties to it to prepare national biodiversity action plans. Zambia has already in place a National Biodiversity Action Plan whose objectives include, ensuring the conservation of a full range of Zambia's natural ecosystems through a network of protected areas, development and implementation of strategies for conservation of biodiversity, sustainable use and management of biological resources.

Biological resources of significant conservation value that will be identified during Project implementation will be conserved and protected.

Relevance: the area earmarked for the plant might have had indigenous trees.

Compliance: CML will endeavor to preserve the tree and incorporate them into the landscape of the proposed project.

2.4.2 Convention on Wetlands of International Importance (1975)

The Convention aims at promoting conservation and sustainable use of wetlands and their resources for the benefit of the present and future generations.

Relevance/Compliance: The Project development and implementation would need to be undertaken in a way that should not comprise the ecological character of the nearby water

bodies.

2.4.3 Convention Concerning the Protection of World Heritage (1972)

The Convention aims at ensuring the identification, protection, conservation, presentation, and transmission to future generations of the cultural and natural heritage.

Relevance/Compliance: Cultural and natural heritage sites that may be identified during the construction and operations of the plant will be protected and conserved in accordance with the provisions of the Convention to which Zambia is party to.

2.4.4 Protection of the World Cultural and Heritage (1972)

This convention was ratified by Zambia in 1982. It provides for the protection of cultural and heritage sites.

Relevance: The proposed plant being in an area which might have some historical background not known to the Developer requires compliance to this Act

Compliance: if any such items are found, they will be handed over to the National Heritage and Conservation Commission.

2.4.5 Ramsar Convention: -

The general objective of the Ramsar Convention is to curtail the loss of wetlands and to promote wise use of all wetlands. The convention addresses one of the most important issues in Southern Africa, namely the conservation of water supplies and use of the natural and the human environments in an intergenerational equitable manner.

Relevance: - The proposed plant may bring about surface and underground water depletion and pollution and therefore the convention will be adhered to.

Compliance: The effluent prone areas will be made of concrete to ensure that all the spillages are contained before contaminating underground water.

2.4.6 African Convention on the Conservation of Nature and Natural Resources (Algiers, 1968), (Maputo, 2003):-

The objective of the convention is to encourage individual and joint actions for the conservation, utilization and development of soil, water, flora and fauna for the present and future welfare of mankind. This must be done from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.

Relevance to the Project: -Soil protection, water protection and protection of flora and fauna shall be a requirement considering environmental aspects of the project. Most of these requirements are already covered under the customizing legal structures already described. However, it is necessary to recognize that these requirements are also provided for at international level hence the relationship.

Compliance: - provisions of this convention together with the customizing regulations are critical to the project.

2.4.7 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):-

The objective of this agreement is to ensure that international trade of wild flora and fauna does not endanger their existence. The convention is customized through the Zambia Wild Life Act No. 12 of 1998 and the implementing body is the Department of National parks and Wildlife.

Relevance to the Project: -The proposed plant area has potential for existence of small animals and birds. If protection measures are not strictly enforced, there is likelihood that employees may start exploiting these resources.

Compliance: - Provisions of this Convention together with the customizing regulations are critical to the project.

2.4.8 Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and their Disposal: -

The objective is to control import and export of hazardous wastes. It also aims at ensuring that any trans-boundary movement and disposal of hazardous waste, when allowed, is strictly controlled and takes place in an environmentally sound and responsible manner.

Relevance: - hazardous wastes may be generated and disposed of.

Compliance: Maximum control measures shall be put in place to ensure that their transportation and disposal is done in accordance with provisions of this Convention.

2.4.9 Equator Principles Adopted for the Project

For the purpose of complying with international best practices in environmental management as a voluntary initiative, CML has adopted three Equator Principles that shall be observed throughout the EIA process including the Scoping Stage. These principles shall also be sustained throughout the project lifecycle. The adopted principles are listed below.

- a) **Principle 5 (Consultation and Disclosure):-** Environmental management by effective consultation and disclosure is now being recognized as the most effective way of ensuring compliance. CML will always consult with affected communities in a culturally and structured manner. To attain this, CML will promote free, fair and informed participation by all stakeholders.
- b) **Principle 6 (Grievance Mechanism):-** CML shall develop and implement a transparent and systematic grievance mechanism and major guiding principles shall be implemented during the EIA Process. This shall be done to develop a good first and sustainable impression with the community.
- c) **Principle 9 (Independent Monitoring and Reporting):-** CML shall facilitate an effective independent monitoring and reporting of project activities that shall interact with the environment. This principle shall be observed starting from the EIA process stage.

2.4.10 United Nations Framework Convention on Climate Change

This was signed by Zambia in 1992. The main objective is to achieve stabilization of greenhouse gas concentrations in the atmosphere. Zambia recognizes that the largest source of one of the main greenhouse gases, carbon dioxide, is from burning wood fuel and the use of coal and oil.

Relevance: - Evidence of climate change is now common knowledge. The CML project may contribute to climate change due to increase in the emissions from the machinery and gas emissions from boilers throughout the project lifespan.

Compliance: there will be no major gas emissions at the processing plant due to the latest machines which are installed.

2.5 Institutional Framework

A number of institutions will have a regulatory and monitoring role directly or indirectly under their respective pieces of legislation. However, the following will be the key institutions whose requirements will need to be complied with:

- **Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP)**

This is a newly formed department, after the abolishment of Ministry of Local Government and Housing. It is in charge of water policy, water supply and sanitation, water resources management and development in the country.

- **Ministry of Health (MoH)**

The Ministry of Health (MoH) has the supervisory responsibility for sanitation and hygiene promotion. The Environmental Health Section of MoH under the Directorate of Public Health and Research is the section most relevant to drainage which is an integral part of sanitation and hygiene promotion.

- **Mumbwa Town Council (CTC)**

Mumbwa Town Council (MTC) is the governing local authority for the Mumbwa. The Local Authority derives its authority from several Zambian laws, but primarily, Section 61 of the Local Government Act enlisting 63 functions of local authorities. CTC's responsibilities include the following, but are not limited to:

- The establishment and maintenance of sanitation and drainage systems to facilitate the removal of refuse and effluent,
- Prohibit and control the use of land and erection of buildings in the interest of public health, safety and orderly development of the Council area, and
- Approval to formalize unplanned settlements.

In the strategic plan, core pillars for the Council include: strengthening institutional governance, enhancing institutional capacity, infrastructure development (especially the central business district), effective management of solid waste and environmental conservation, maintenance of health standards through health programmes, enhancement of revenue base and efficient utilization of finance and enhancement of community

participation in civic matter within the Mumbwa Town Council.

- **Water Resources Management Authority (WARMA)**

WARMA was set up by the Zambian Government, following the water sector reforms process that led to the enactment of the Water Resources Management Act of 2011. WARMA is an authority whose main function is “to promote and adopt a dynamic, gender-sensitive, integrated, interactive, participatory and multi-sectoral approach to water resources management and development that includes human, land, environmental and socio-economic considerations, especially poverty reduction and the elimination of water borne diseases, including malaria”. It is also responsible for managing and regulating the use of Zambia’s water resources in an integrated, participatory and sustainable manner based on human, land, environmental and socio-economic considerations.

- **Zambia Environmental Management Agency (ZEMA)**

Zambia Environmental Management Agency (ZEMA) is a statutory body established in 1992, under Environmental Protection and Pollution Control Act, 1990. It was earlier known as Environmental Council of Zambia. Its mandate is to protect environment and pollution control to provide health and welfare of persons, as well as the environment. Part VI of the above- mentioned Act assigns ZEMA certain roles and responsibilities which are as follows:

- Formulating and providing standards on classification and analysis of wastes and advising on standard disposal methods and means;
- Publicizing the correct means of storage, collection and disposal of any class of wastes; and
- Maintaining statistical data on nature, quantity and volume of waste generated and on- sites where waste disposal is taking place or has taken place.

3

PROJECT DESCRIPTION

3. PROJECT DESCRIPTION

3.1 History of the Project

CEDARS Minerals Limited (CML) is a newly incorporated company in Zambia. They intend to explore and grow the mining sector in the country by constructing and operating a copper processing plant in Kitumba area of Mumbwa district. CML intends to construct a concentrator to process 300 tons per day of copper ore sourced from the big concession area of Mumbwa district. Cedars Minerals Limited has also engaged a local license owner – Minetech Resources Limited and signed a copper ore supplying agreement with the same company to shall supply up to 300 tons per day of Copper Ores.

The proposed plant will produce 10 tons per day of copper concentrate.

3.2 Key Stakeholders

The major stakeholders identified are:

- Cedars Minerals Limited staff – the proposed site
- Local communities – these include neighbouring facilities and settlements such as Kitumba Community School and staff houses, Kitumba Correctional Facility, Kitumba Health Center and other surrounding areas for public consultations and raising concerns on this project.
- Mumbwa Town Council – mandated to monitor all the projects in the District.
- Zambia Environmental Management Agency – Lusaka reviewing the project and ultimate approval of this Project.
- Lukanga Water Supply and Sanitation Company

3.3 Justification of the Project

Project Motivation

The shareholders of CML have been motivated to construct the Copper Processing Plant to make profit for them by selling processed copper locally and internationally. The increasing demand for Copper in Zambia and globally and the availability of raw materials (copper ore) in Mumbwa has created a conducive business environment.

The proposed plant will help Zambia meet the demand for finished Copper product and subsequent reduction of local prices.

3.4 Description of the plant area

3.4.1 Location

The site for the proposed Copper Processing Plant which covers an area of **4ha** of the total 94ha is located in Kitumba Area, Chieft Kaindu's chiefdom, on Mumbwa-Kasempa Road, Mumbwa District, and 45 kilometers southwest of Mumbwa Town. The proposed site is located in Mumbwa District and is a brownfield area accessed by driving 45 kilometers southwest of Mumbwa Town on the D181 dirt road towards Kasempa. The built-up environment near the project constitutes;

- Kitumba Community School and staff houses within 3.3km radius from the project

site

- Sugar loaf shopping complex is constructed approximately 3.5 km from the project site
- Kitumba Correctional Facility approximately 6km from the site
- Kitumba Rural Health Post approximately 6km from the project site
- Kafue National Park is approximately 21.5km from the project site.

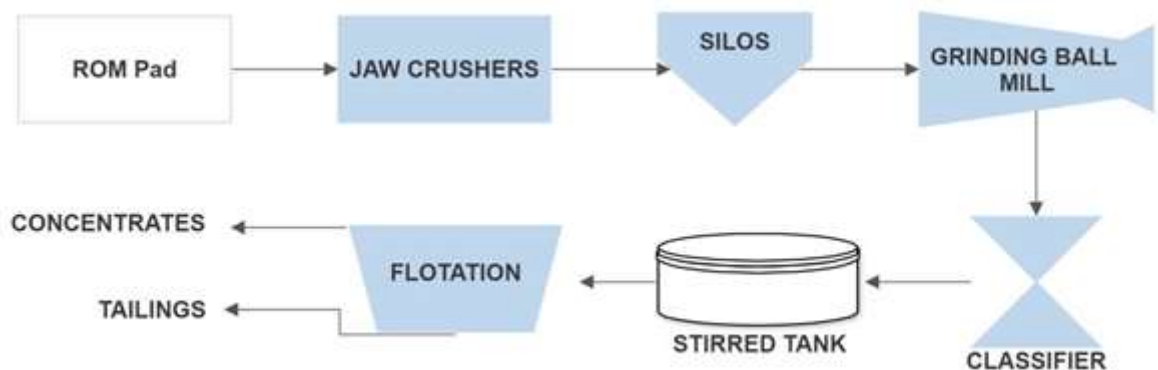
The proposed plant will be constructed in 2023 and once done, operational will involve procurement of the copper pre which will be processed to make copper concentrate.

3.4.2 Plant Component Description and Flow of Material

The main components of the proposed facility are Milling, Flotation and concentrate dewatering and storage.

There are nine (9) unit operations involved in the processing copper are itemized below;

- Crusher
- Ball Mill
- Water Reservoir Facilities
- Ore Stockpile Area
- Conveyor Belt
- Lime-Water Mixing Tank
- Neutralization Tank
- Weighbridge
- Tailings Storage Facility (TFS)
- Pollution Control Dam (PCD)



Ore from the stock pile will be loaded into a bin using a front-end loader. The bin will feed a crusher by conveyor belt. CML plans to use the Jaw Crushers to reduce the size of ore rocks into smaller sized pieces for feeding into the process stream. CML intends to use the eccentric overhead style Jaw Crusher with the moving swing jaw is suspended on the eccentric shaft with heavy-duty double roll spherical roller bearings. The swing jaw undergoes two types of motion: one is a swing motion toward the opposite chamber side (called a stationary jaw die due to the action of a toggle plate), and the second is a vertical movement due to the rotation of the eccentric. These combined motions compress and push the material through the crushing chamber at a predetermined size suitable for the process.

The process will use the Ball Mill to further crush the ore to the required particle size for further processing in the crushed ore. A ball mill is a type of grinder used to grind, blend and sometimes for mixing of materials for use in mineral dressing processes. It works on the principle of impact and attrition: size reduction is done by impact as the balls drop from near the top of the shell. A ball mill consists of a hollow cylindrical shell rotating about its axis. The axis of the shell may be either horizontal or at a small angle to the horizontal. It is partially filled with balls. The grinding media is the balls, which may be made of steel (chrome steel) or stainless steel. The inner surface of the cylindrical shell is usually lined with an abrasion-resistant material such as manganese steel.

The product from the ball mill will use the classifier for the classification of the material before being sent to the stirred tanks and eventually flotation. In the stirred tanks, the material will be mixed or blended then to the flotation circuit.

The flotation is a process for selectively separating hydrophobic materials from hydrophilic environments and is used in mineral processing industries. The flotation process has improved the recovery of valuable minerals, such as copper-bearing minerals and has allowed the economic recovery of valuable metals from the ore. In the flotation circuit, the ground ore is mixed with water to form a slurry, and the copper in the ore is rendered hydrophobic by the addition of a surfactant or collector chemical. This slurry (more properly called the pulp) of hydrophobic particles and hydrophilic particles is then introduced to tanks known as flotation cells that are aerated to produce bubbles. The hydrophobic particles attach to the air bubbles, which rise to the surface, forming froth. The froth is removed from the cell, producing a copper concentrate recovered for the drying process. Froth flotation efficiency is determined by a series of probabilities: those of particle–bubble contact, particle–bubble attachment, transport between the pulp and the froth, and froth collection into the product launder.

The concentrates produced will be allowed to air dry to an appropriate moisture content required by the buyers before shipping it out.

The pollution control dam (PCD) will be an important facility in the management of wastewater and effluent at the project site. It will be useful to control pollution arising from the leaching process in case of leakages, and to retain/contain dirty wastewater.

CML plans to store the waste materials on site by depositing tailings into the tailings storage facility on-site covering an area approximately 50*100 meters and 1- 4meters sliding in depth. The tailings will be deposited in the form of thick slurry for more straightforward handling purposes. The developer will construct an appropriate perimeter berm to keep storm water away from the flowing into surface water in the rain season. The thick slurry will to be deposited to the tailing's storage facility will press the tailings in the filter press to reduce the water content. The tailing will not be stored permanently in the tailings storage facility, periodically they will be removed and transported to a buyer in Kabwe through a registered transporter.

3.5 Relevant policy, legislative and planning framework

This document has been prepared in line with the requirements of the Zambian Environmental Management Act, 2011 and its subsidiary legislation, the Environmental Impact Assessment Regulations, 1997 (Statutory Instrument No.28 of 1997). It also refers to

the Local Government Act, of 2019, the Urban and Regional Planning Act, 2015, the Water Resource Management Act, 2011, the Public Roads Act, 2002 and other applicable legislations and regulations. The administrative framework within which the proposed project will be implemented will include Zambia Environmental Management Agency (ZEMA), the Mumbwa Town Council, Ministry of Housing and Infrastructure Development, Water Resource Management Authority (WARMA) and other regulatory and government agencies.

Project implementation will also conform to international conventions and internationally recognized standards such as Equator Principles (EP). The EP are based on and implemented in accordance with World Bank Group's International Finance Corporation (IFC) Performance Standards and the IFC Environmental Health and Safety (EHS) Guidelines.

This project will be implemented within the confinement of these guidelines and the following:

- The Environmental Management Act NO. 12 OF 2011
 - Statutory Instrument No. 112 of 2013; Part II on Air and Water pollution (Licensing) Regulations
 - Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 part III
 - Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 Part II
 - Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 Part IV
- The Factory Act 1966
- Urban and Regional Planning Act, 2015 PART III section 17
- The occupation health and safety act of 2010 PART IV Section 16
- Public Health Act Cap 295 of 1978 Part V Section 31
- The Local Government Act No. 2 of 2019 Introductory Part
- The Fisheries Act No. 22 of 2011
- The Water Resources Management act No. 21 of 2011 Section 6
- The National HIV/AIDS/STI/TB Act of 2002 Section 4
- The National Heritage and Conservation Act (Cap.173 of 1989) Section 8
- The Employment Code Act No. 3 2019 Introductory Part
- Workers Compensation Act No. 10 of 1999 Section 6
- The Road Traffic Act Cap 464 Section 196
- The Mines and Minerals Development Act No. 11 of 2015
- The Lands Act (Cap. 184 of 1995) Section 8
- The Forest Act No.4 of 2015 (The Forests Community Forest Management Regulations, SI No. 11 OF 2018.

3.6 Identification of associated projects

The Copper Processing Plant has nearby mines including Kamiyobo (Non-Operational), Sugar Loaf (Minetech), Kitumba (Intrepid), Crystal Jacket (Non-Operational), Silver Kings (Operational with low grade of copper) and different companies such buy the copper ore Therefore there could be possibilities of these facilities competing for the same the raw material.

3.7 Project Products and by- products

Materials to Be Used

Copper ore is the major raw material for the project. River sand ,Building sand, Laterite, Cement and General Building materials (concrete blocks, timber, diamond and reinforced mesh) during construction whilst Water, Electricity and Diesel in production and construction phases. All these raw materials will be sourced from local suppliers.

Products

The plant will process 300 tons of copper ore per day and produce about 10 tons of finished copper per day

By-products and Wastes

Other wastes from the production line include:

- **Non-hazardous Solid waste:** include material such as scrap timber and various off cuts and refuse such as discarded packaging, garbage and domestic waste from workers canteen etc.
- **Hazardous waste:** hazardous waste results from operation activities; these comprise mainly used oil / lubricants.
- **Runoff:** Storm water from the site
- **Dust:** Dust generated on site due to movement of vehicles.
- **Exhaust emissions:** from operation of vehicles on site.
- **Emissions:** Gas emitted from the production line.

A dedicated storage house for chemicals shall be constructed and this shall have all the necessary facilities such as good ventilation, lighting, enough space, roof, concrete floor, and warning signs.

Raw materials and chemicals to be used will include:

- Copper ore;
- Raw water;
- Lime;
- Froathers such as Sodium Ethyl Xanthate (SEX), Sodium Isopropyl Xanthate(SIPX); and Collector: Xanthate

sewage and other liquid effluents will be channeled into the on-site septic tank. Prevent discharge of tailings out of the embankment area. Maintain slightly alkaline conditions and long residence time to precipitate solids in the TSF. Designing the TSF with a filter under-drainage system to collect seepage and direct it to PCD via toe drains. Discharge of the tails to surface will be avoided. Also the effluent shall be monitored weekly for Conductivity, Dissolved Oxygen, pH and Total Dissolved Solids using a potable field water monitoring instrument. Samples shall also be analyzed using a reputable laboratory at least once in three months.

A perimeter drain shall be constructed around the plant to facilitate trapping of all the solids that may be washed by storm water. A standard workshop with a dedicated storage facility and generation facilities for hazardous waste shall be constructed. This shall be concrete lined, signs shall be installed and a water/oil separator shall be installed for all the effluent from the workshop and the washing bay. A wash-bay for heavy machines as well as light

vehicles shall be constructed and this shall be concrete lined with a perimeter drain connected to a silt trap for capturing solids from washing activities. The overflow from the washing bay silt trap shall be directed into the central oil/water separator for trapping possible hydrocarbons from washing activities. All the hazardous wastes shall be segregated and stored within the workshop in a dedicated hazardous waste storage room.

Table 3.1 Sources of waste and disposal during construction/operations

Waste	Source	Disposal
Glass	Broken panes during construction and maintenance works	Disposal – Municipal dumpsite if broken.
Rubber, plastic	Left-over pieces and wrappings during constructions	Recycled – taken to licensed scrap dealers.
Iron, steel	Off cuts during construction and maintenance works	Recycled – taken to licensed scrap dealers.
Tailings	process	Disposal – Tailings storage facility
Packaging	Empty cement bags, fittings, plastics, paper and cardboard	Disposal – Municipal dumpsite Recycling companies like Flex waste.
Office waste	Administrative works	Disposal – Municipal dumpsite
Oil-soiled waste	Plant maintenance	Stored and disposed of by licensed hazardous waste handlers
Domestic waste (food scraps, rags)	Cleaning	Reused – Composted Reused – Reuse and composting Disposal – Municipal dumpsite

3.8 Resources for project implementation

Resources required for successful implementation and operation of the project include the total financial cost of construction works estimated at **US\$ 3,500,000.00**. Skilled and unskilled human resource shall be local and Zambia at large., ,

, office waste, , glass, metal drums,

3.10 Project Location

The plant is located off Mumbwa-Kasempa road, situated in Kitumba Area, Chieft Kaindu’s chiefdom, on Mumbwa-Kasempa Road, Mumbwa District of Central province. **Cedars Minerals Limited** proposed copper processing concentrator is 45 kilometers southwest of Mumbwa Town. It is accessed by driving 45 kilometers southwest of Mumbwa Town on the D181 dirt road towards Kasempa and covers an area of 94 hectares.

Table 3.2 Proposed Site Coordinates

TABLE 1.3: CML SITE COORDINATES
--

Beacon No.	Description	Eastings	Northings
1	Corner point A	E-483298.852;	N-8369996.933
2	Corner point B	E-484164.854;	N-8370516.678
3	Corner point C	E-484426.532	N-8369396.776
4	Corner point D	E-483453.211	N-8369228.321

Copper Processing Plant - Mumbwa



Figure 3-1: Location Map of the proposed Copper Processing facility

3.11 Size of Project Area

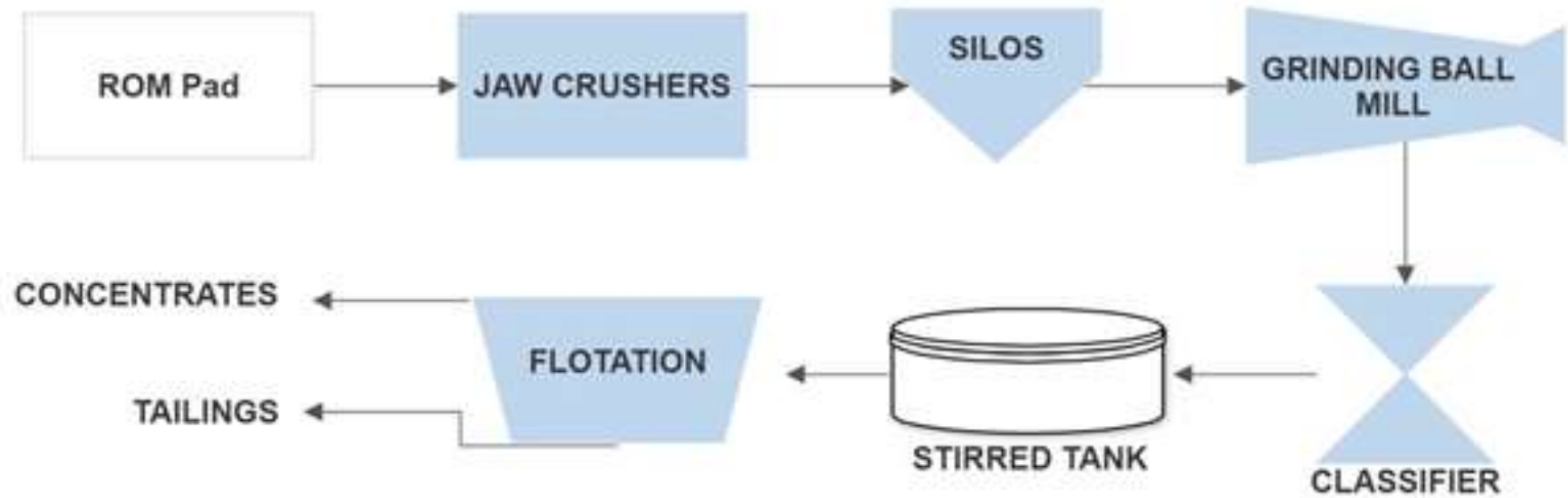
The Copper Processing Plant covers an area of **4ha** in extent.

3.12 Nature of the Project

The project will involve construction of a fully functional copper processing plant with all process components. The copper processing plant is for the production of copper concentrate.

The proposed copper processing plant will be constructed in 2023 and once operational will involve procurement of copper ore which will be processed to make copper concentrate. The proposed plant will focus on the production of copper concentrate and lie within the confines of value addition of extracting copper concentrate from copper ore for market and Facilities/infrastructure to be at the plant will include;

- Crusher
- Ball Mill
- Water Reservoir Facilities
- Ore Stockpile Area
- Conveyor Belt
- Lime-Water Mixing Tank
- Neutralization Tank
- Weighbridge
- Tailings Storage Facility (TFS)
- Pollution Control Dam (PCD)
- Toilets, soak away/septic tank
- Laboratory
- Administration office



3.12.1 Raw Materials

The project will require the following raw materials; copper ore from Minetech Resource limited and several sources within the project area in the production process and River sand ,Building sand, Laterite, Cement and General Building materials (concrete blocks, timber, diamond and reinforced mesh) during construction whilst Water, Electricity and Diesel in production and construction phases.

During maintenance phase, steel roofing sheet and normal concrete, cement and blocks will be used with wall finishes done using paint. Maintenance of structures and common areas will include routine cleaning of plant, office corridors and public toilets, maintenance of physical structure (e.g. roof / walls of the plants), security lighting and fire equipment. The car park and internal roads will be cleaned routinely and monitored on a day to day basis for damage to the road surface. Any repairs necessary shall be carried out by the Proponent

The majority of the materials will be procured locally. Where local suppliers are not available or where local products are found to be of inferior quality and specification, the developer will import from neighboring countries.

The raw materials (construction materials for the TSF and PCD) that are envisaged to be used during the project lifecycle and their sources are shown in table below;

	Raw Material	Source	Mode of Delivery
CONSTRUCTION PHASE			
1	River and building sand	Local suppliers	Road truck
2	Aggregates and laterite	Local approved suppliers	Road truck
3	Cement	Local	Road truck
4	Concrete blocks	Local suppliers	Road truck
5	Diesel (for operation of the generator and machinery)	Local approved suppliers. Diesel will not be stored on site	Road truck
6	Water	Water from nearby stream and On-site borehole. There will be operational borehole	Site water reticulation
7	General building materials (e.g. timber for shuttering, polythene sheeting, sewer pipes, paint etc.)	Local approved suppliers	Road truck

8	Finished products and equipment, structural steel components, sanitary ware, brass ware and finishing, piping, switches, tiles etc.	Local approved suppliers and imported ensuring compliance with Zambian standards and regulations.	Road truck
OPERATION PHASE			
1	Water	Site borehole	Site water reticulation
2	Electricity	Zambia	electricity Corporation (ZESCO)
3	Emergency Power supply (Generators)	Local approved suppliers and imported ensuring compliance with Zambian standards and regulations	Road truck
4	Maintenance equipment	Local approved suppliers	Road truck
5	Items to be sold and used in the shop building	Local and international approved suppliers	Goods vehicle

Chemicals to be used will include:

- Lime;
- Froathers: Sodium Ethyl Xanthate (SEX), Sodium Isopropyl Xanthate(SIPX);
- Collector: Xanthate

3.14 Drainages

Drainage from paved areas will designed to carry and discharge storm water into the Company storm water drains of the site. These drains will channel water into the treatment pond.

3.15 Security

There will be a delivery entrance and the main entrance to the site. The day to day security responsibilities will be out sourced to a qualified and respected Security company and a security mandate already drawn up.

3.16 Landscaping

Various areas of landscaping will be incorporated in the design of the expansion work at the site. Boundaries, both internally and externally will be landscaped to create a visual buffer. Areas around the parking lots will also be landscaped to create a visually pleasing environment.

3.17 Project Main Activities

The project will be developed in four (4) phases - preparatory works; construction of all supporting infrastructure such as: site clearance, external

and internal access roads, exterior security fence around the site, drainage and sewage reticulation, Construction Phase, Operation Phase and Decommission and Closure Phase Operational phase.

The following are among the expected activities that will be undertaken for the proposed extension: -

3.17.1 Site Preparation phase

During preparation will involve removal of vegetation and scarifying of topsoil. This will be followed by basic earthworks (cut and fill) to establish the required levels and falls and to prepare the platform for the plant. Fill material will mostly be laterite. Earthworks will involve the use of heavy machinery such as bull dozers, excavators, dump trucks, and graders.

Other activities will include recruitment of workers, clearing the access route and the construction site

- Assemble EIA Team
- Prepare Terms of Reference (TORs) and Scoping Meeting (held at Mumbwa Town Council with main stakeholders)
- Conduct field visits for specialized studies
- Prepare Specialized study reports
- Conduct Disclosure Meeting with a limited number of stakeholders
- Prepare draft EIS Report;
- Prepare final EIS for submission to ZEMA

This phase will mainly include clearing of vegetation for construction of the plant, offices and the associated structures. Land clearing will be done using heavy machinery. Clearing and preparation of land will employ procedures that will minimize emission of Green House Gasses. Cleared organic matter (biomass) will not be burnt but chipped and ploughed into the soil during land preparation stage or use.

Recruitment and Training of Personnel: The project will involve the recruitment of both skilled and unskilled staff. For the unskilled staff preference will be for consideration of local communities as a way of empowering them. This is also in line with Government Employment Policy.

3.17.2 Construction phase

The Construction Phase shall include construction of the copper processing plant.

The main activities of the Construction Phase will be digging and earthworks to prepare foundations, compacting of foundations, setting of concrete footing/basement, setting and erection of block walls, partitioning, roofing, painting, plumbing, wiring, electrification and installation of fittings including windows, doors, toilet facilities, shelves, etc. All the building materials will be sourced locally. A borehole will be sunk on site to supply water for construction activities.

The Construction of roads and car park will involve earth moving and shaping of formation and shoulders and stabilization of the base with the

piling, spreading and compaction of laterite, gravel and aggregate materials on the road. Construction of the surface pavement will involve the spreading and compaction of hot asphalt materials on the road. Construction of drainage will involve excavation and shaping of drains and soil compaction. The lining of drains will require the preparing and pouring of concrete. Construction of foundations will involve the compaction of underside of foundation trenches and the mixing, pouring and compaction of concrete. Construction of services will include the laying of water and sewage reticulation pipes and underground electrical cable. Gravel, laterite and stone aggregates will be acquired and transported to the site from approved sources within the project site. Materials that will be transported and stored include sand, aggregate, laterite, cement, blocks, and timber. Provision will be made for bulk storage on site of these materials.

Landscaping of the project site will involve the establishment of lawns and flowerbeds. The Developer will as much as possible try to retain or preserve the existing natural vegetation around the site. Waste management during the construction phase will include:

- Disposal of excess topsoil and vegetative material from site preparation and clearing.
- Provision of temporary workers sanitation.
- Collection and disposal of domestic waste at approved disposal site.
- Transportation and disposal of building waste and rubble

3.17.3 Operation phase

This will start with commissioning of the plant (processing of copper ore), the activities under this phase will comprise of the following:

- Transporting copper ore from licensed suppliers.
- Stockpiling copper ore on site.
- Crushing copper ore.
- Milling to produce pulp.
- Flotation
- Concentrate dewatering and storage

Copper ore will be transported from licensed suppliers and stockpiled on site. The materials from the stockpile will then be loaded into a bin using a Front-End Loader. The bin will feed a primary crusher by conveyor belt. CML plans to use the Jaw Crushers to reduce the size of ore rocks into smaller sized pieces for feeding into the process stream. CML intends to use the eccentric overhead style Jaw Crusher with the moving swing jaw is suspended on the eccentric shaft with heavy-duty double roll spherical roller bearings. The swing jaw undergoes two types of motion: one is a swing motion toward the opposite chamber side (called a stationary jaw die due to the action of a toggle plate), and the second is a vertical movement due to the rotation of the eccentric. These combined motions compress and push the material through the crushing chamber at a predetermined size suitable for the process.

The process will use the Ball Mill to further crush the ore to the required particle size for further processing in the crushed ore. A ball mill is a type of grinder used to grind, blend and sometimes for mixing of materials for use in mineral dressing processes. It works on the principle of impact and attrition: size reduction is done by impact as the balls drop from near the top of the shell. A ball mill consists of a hollow cylindrical shell rotating about its axis. The axis of the shell may be either horizontal or at a small angle to the horizontal. It is partially filled with balls. The grinding media is the balls, which may be made of steel (chrome steel) or stainless steel. The inner surface of the cylindrical shell is usually lined with an abrasion-resistant material such as manganese steel.

The product from the ball mill will use the classifier for the classification of the material before being sent to the stirred tanks and eventually flotation. In the stirred tanks, the material will be mixed or blended then to the flotation circuit.

The flotation is a process for selectively separating hydrophobic materials from hydrophilic environments and is used in mineral processing industries. The flotation process has improved the recovery of valuable minerals, such as copper-bearing minerals and has allowed the economic recovery of valuable metals from the ore. In the flotation circuit, the ground ore is mixed with water to form a slurry, and the copper in the ore is rendered hydrophobic by the addition of a surfactant or collector chemical. This slurry (more properly called the pulp) of hydrophobic particles and hydrophilic particles is then introduced to tanks known as flotation cells that are aerated to produce bubbles. The hydrophobic particles attach to the air bubbles, which rise to the surface, forming froth. The froth is removed from the cell, producing a copper concentrate recovered for the drying process.

The plant will use power from the national grid (ZESCO). A standby diesel generator will be used in times of ZESCO power outages.

During operation phase, the following activities shall also be carried out:

- Rehabilitation works on certain buildings and plant areas
- Repainting of old buildings
- Areas prepared for parking will be surfaced with tarmac;
- Areas surrounding buildings and parking areas will be landscaped.

Maintenance of structures and common areas will include routine cleaning of plant and office corridors and public toilets, maintenance of physical structure (e.g. roof / walls of the plants), maintenance of security lighting and fire equipment. The car park and internal roads will be cleaned routinely and monitored on a day to day basis for damage to the road surface. Any repairs necessary shall be carried out by the Proponent.

Waste Management

- All waste will be stored at the designated waste bins within the company premises awaiting a ZEMA Licensed transporter to take waste for disposal at the nearby dumpsite. Wherever possible, reuse of waste will be encouraged. All waste will be disposed (non-organic and organic) will be collected and

temporarily stored at the designated site, where separation will be done and transported to the government approved dumpsite by a reputable contracted company.

Effluent Storage

- During construction phase sewage waste will be managed by the use of built toilets. During operation phase all sewage from the plant will be discharged through appropriate underground sewer lines into the proposed septic tank and soak away system. Storm water from the plant will be channelled to the pond and then recycled back into the process.

Hazardous waste

- Hazardous waste will generally comprise of used oils and lubricants to be stored in drums at designated storage sites. Once sufficient waste is collected, an approved and recommended contractor by ZEMA collects the waste for disposal at a suitably licensed waste disposal site.

3.17.4 Decommissioning phase

The closure plan for the project will include; Back filling, re-vegetate and re-grass some part of the plant progressively until closure. Post-closure, the site will be fully re-vegetated and re-grassed. After lapse of this period, an application for closure certificate will be lodged.

This phase shall include the following;

- Repairing all the structures to a suitable state for alternative uses.
- Conducting re-vegetation activities where possible around the entire project area.
- General clean-up of the site.

The tailings dam area will be re-profiled to establish the natural drainage pattern. All reusable and recyclable materials and scrap of good value will be salvaged and sold off. Site leveling and re-profiling shall be done to re-establish the natural drainage pattern across the site, after which, the site shall be re-vegetated with indigenous grasses and trees. All materials and equipment that cannot be reused recycled or sold shall be disposed of at an approved non-hazardous disposal site. The following activities are anticipated to be carried out:

Site Drainage Systems

After cessation of operations, drainage channels and open surfaces will be re-profiled with the additional soil amendment material such as rock from elsewhere, previously stripped topsoil and organic matter and re-vegetated. The re-shaping and grading of a site is essential for rehabilitation to ensure that the final landform is hydrological compatible with surrounding areas. This entails making slopes stable and less prominent.

Re-vegetation

For the purposes of re-vegetation, the proposed project will collaborate with the Forestry Department who already has a nursery of indigenous plant tree species in Mumbwa. All the preparatory works will be completed before the time when the seeds are most likely to experience the conditions they need to germinate and survive such as reliable rainfall and suitable temperatures.

Monitoring

The monitoring plan and its implementation shall be spearheaded by the different government departments. These shall particularly be the Zambia Environmental Management Agency (ZEMA) Mines Safety Department (MSD), and the Mumbwa town council. The current engagement with the Provincial department is creating a platform from which this backstopping can be achieved, once the plant ceases and the site decommissioned.

4

ANALYSIS OF ALTERNATIVES

PROJECT ALTERNATIVES

A variety of alternatives, such as the following, exist for the design and management of the project.

The characteristics of the identified sites are briefly outlined below.

4.1 Project Need

The shareholders of CML have been motivated to construct and operate a copper processing plant to make profit for them by selling copper concentrate both locally and internationally. The increasing demand for Copper in Zambia and other countries and the availability of raw materials (copper ore) in Mumbwa has created a conducive business environment.

The proposed project will help Zambia meet the demand for Copper and copper products as well as help reduce importation of copper products and subsequent reduction of local prices.

4.2 Site Alternative

Two alternative site localities were evaluated using the following criteria; Land Acquisition, Resettlement and Compensation, Market and Infrastructure Accessibility during the Scoping Phase of the Environmental Impact Assessment. The alternatives as follows:

- **Alternative A: To Use the acquired Land in Mumbwa District**

The site in Mumbwa District has all the land acquisition papers put in place. There are no settlers on this land and moreover, it is close to the small-scale mines in the area and easily accessible by a gravel road (Mumbwa-Kasempa Road) where there is easy access to copper ore supply. This is in line with the National Development Plan

- **Alternative B: Source a Land Parcel in elsewhere**

This alternative requires sourcing another land parcel through discussions with local authorities. It could involve resettlement and compensation of project affected persons (PAPs). Moreover, access roads will have to be constructed.

4.3 Raw materials

Three alternatives for raw materials were evaluated using the following criteria;

- Technology to be used
- Availability of the raw material
- Prices
- Market
- Accessibility during the Scoping Phase of the Environmental Impact Assessment

4.4 Water Supply Alternative

The use of bore hole for water supply was analyzed against connecting to a local water supply utility company and buying of disposable water bottles for domestic use. The use of boreholes was preferred for the project operations and domestic and industrial use as an alternative which seemed to be cheaper and appropriate.

4.5 Energy sources

The principal source of electricity during operational phase of the project will be hydro-power energy to be sourced from a nearby ZESCO main which is found within reach of the project site. The ZESCO main was picked as a major source of power as it provides the clean and less costly power alternative which is also environmentally friendly. The use of a generator was also analysed against but since its costly operating Gensets, CML will have the Gensets at the site only to be run during power outage.

4.6 Alternative Processing Technology/Methods

There are various technological options that have been considered for CML Copper Processing Plant. The technology to be used is key in determining the efficient operations and also environmental responsibility on the part of CML. The technology to be employed will involve the Milling, Flotation and concentrate dewatering of the copper.

4.7 Waste Management Alternatives

The option of using the waste bin was analysed against using a skip bin. The first option meant that the company needed to buy many waste bins, which have a limited holding capacity. The second option was opted as the skip bin has a huge carrying capacity. The proponent will engage a solid waste collector to ensure waste management at the facility is well maintained. All non-organic waste will be collected and disposed of using a reputable company and taken to the council dumpsite.

4.8 Sewage management alternatives

Three options for sewerage and waste water treatment have been considered.

Option 1 requires that the sewage water be discharged to the municipal sewage plant. This option will require that the plant sewer system be connected to Mumbwa Town Council sewage. This area has no council sewer system yet.

Option 2 is the preferred option in which a sewer package (septic tanks and effluent retention ponds) that would be installed for the office complex and change house, with the effluent being pumped out and discharged into the council sewer ponds on licensed arrangement. **This option was considered best fit.**

Option 3 would be to discharge the sewage effluent from the package plant to the nearby streams as it would contain nutrients (nitrate and phosphate) that would nourish the riverine system and hence contaminate water and cause harm to the eco-system.

4.9 The “No Action” or “No Project alternative”

The no project (no-action alternative) alternative in respect to the proposed project implies that the status quo is maintained. Under the no-project alternative, the existing land use will not be used; neither shall the project be implemented. The land owner will continue not to make any good value of the land. The proposed copper processing project would not be constructed and the expectations attached to the project would not be met. The no-project construction alternative is the least preferred from the socio-economic perspective due to the following factors:

- ✓ The existing land use is not profitable to the optimum.
- ✓ The land is underdeveloped and no profits are being generated from it as opposed to the time when the plant is installed and is operational;
- ✓ No employment opportunities will be created from the proposed land parcel if the project is not implemented.
- ✓ National GDP will definitely lose out at this period of economic slump down due to low productivity in the country.

From the analysis above, it becomes apparent that the “no project alternative” is not a viable alternative to the proponent.

5

DESCRIPTION OF THE BASELINE ENVIRONMENT

5. DESCRIPTION OF THE BASELINE ENVIRONMENT

This section describes briefly the environmental and social conditions of the facility's area. It gives highlights on climate, rainfall, wind, hydrology, geology, air quality, soils, land use / land tenure, flora and fauna, archaeology and cultural heritage, traffic volume, noise and socio-economics.

The bio-physical data of the proposed project area was gathered by both literature review and field visits to the site. Climatic data was collected from a Metrological department and weather website (www.weatherbase.com.) Data on air quality, flora, fauna and existing physical developments and infrastructure were collected on-site during field visits. The hydrology, geology, and topography of the area were established by both field visits and literature review.

Ecologically, the proposed copper processing plant site was divided into four strata in four directions i.e. North, West, East, and South for easier management purposes. The stratum was arrived at, depending on the administrative boundaries, the size in terms of coverage, and the physical barriers. In each strata, one transect of 100m was established. Thereafter, with each 100m transect, four plots of 20m apart from the other were established.

A Garmin Quest, Global Positioning System (GPS) Navigation instrument, was used by the study team to capture and record some of the geographical data at the site. GPS coordinates were collected, recorded on the instrument, and later exported to a web-based Google earth App for analysis.

5.1 Climate

Mumbwa climate is typical of the Central African Plateau whose annual pattern of weather is largely determined by the movement of the Inter-Tropical Convergence Zone (ITCZ). Available data indicates that Mumbwa District has two distinct seasons that characterize the climate of the Project Area: The wet season extending from October to April, and the dry season from April to September. July is usually the coldest month and October the hottest month. The average temperature in Mumbwa is about 20oC throughout the year.

The Relative humidity of the study area varies, the muggier period of the year lasts for 5.0 months, from November 13 to April 14, during which time the comfort level is muggy, oppressive, or miserable at least 22% of the time. The muggiest day of the year is January 27, with muggy conditions 88% of the time.

The least muggy day of the year is July 29, when muggy conditions are essentially unheard of).

According to the Zambian government, the district falls in agro-ecological region II whose weather is heavily influenced by the Inter-Tropical Convergence Zone (ITCZ).



5.1.1 Temperature

The Project site has a hot season lasts for 2.1 months, from September 16 to November 20, with an average daily high temperature above 88°F. The hottest day of the year is October 21, with an average high of 91°F and low of 68°F.

The cool season lasts for 2.2 months, from May 28 to August 3, with an average daily high temperature below 78°F. The coldest day of the year is July 5, with an average low of 49°F and high of 75°F.

5.1.2 Relative Humidity

Relative humidity of the study area varies, the muggier period of the year lasts for 5.0 months, from November 13 to April 14, during which time the comfort level is muggy, oppressive, or miserable at least 22% of the time. The muggiest day of the year is January 27, with muggy conditions 88% of the time.

5.1.3 Sunshine

At the peak of summer (i.e.; October), the sun is expected to shine for an average of 10 hours per day. This represents the average number of hours in the daytime that the sun is visible and not obscured by cloud e.g. the average number of hours the sun is actually out and shining. In winter (i.e.; June and July), the sun shines for an average of 8 hours per day. There is more sunshine during the dry season than during the wet season. Sunshine hours decrease from December to March and then start to increase in April and May.

5.1.4 Rainfall

The study area experiences extreme seasonal variation in monthly rainfall. The rainy period of the year lasts for 6.4 months, from October 16 to April 29, with a sliding 31-day rainfall of at least 0.5 inches. The most rain falls during the 31 days centered around January 1, with an average total accumulation of 6.7 inches. The rainless period of the year lasts for 5.6 months, from April 29 to October 16. The least rain falls around July 24, with an average total accumulation of 0.0 inches.

5.1.5 Wind

The study area experiences an average hourly wind speed in Mumbwa experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 4.0 months, from July 21 to November 21, with average wind speeds of more than 9.4 miles per hour. The windiest day of the year is October 3, with an average hourly wind speed of 12.3 miles per hour.

The calmer time of year lasts for 8.0 months, from November 21 to July 21. The calmest day of the year is February 6, with an average hourly wind speed of 6.5 miles per hour.

5.2 Soils

The major soils in the area are the Leptosols in the Hills and minor scarps (slopes predominantly over 16%) and Lixisols in the plateau: flat to gently undulating (slopes 0-5%). The Leptosols are fine loamy soils association of orthidstric LEPTOSOLS, well drained, shallow to moderately shallow, yellowish red, to strong red to yellowish brown, friable, fine loamy soils, and well drained, very deep, yellowish red to strong brown frale, fine loamy soils.

Lixisols in the plateau are well drained, moderate to very deep, dark red to dark reddish brown, friable, moderately leached, fine loamy to clayey soils having a clear increase with depth; in places with a humic topsoil and in places abruptly underlying a thick pale brown to white, well drained, very deep, strong brown to red, friable, moderately leached, fine loamy to clayey soils; in places abruptly underlying a thick pale brown to white loamy sand to sandy loam topsoil.



Soils at the proposed site

The existing available data will be used to benchmark future rehabilitation activities during decommissioning and closure.

5.3 Topography

Most parts of the district is a monotonous plateau land with elevation of 1202m asl. There are however, a few peaks which rise upto 1500m asl with the highest which are Nambala hills. The project area lies at an altitude of approximately 1320 and 1460m above sea level. The Kitumba Hills predominantly influence the copper processing plant as mining activities are centred on the same Kitumba Hills.

5.5 Air Quality and Noise

Air/Dust

The main sources of dust emissions that can reduce local air quality within the project area include movement of vehicles along the Mumbwa-Kasempa road. During construction phase, the surrounding human communities, flora, and fauna have the potential of being exposed to dust emissions. During operation phase, the crushers in the plant will also be a source of air pollution.

The ambient air concentration levels of Particulate Matter (PM_{2.5} and PM₁₀) were within the emission limit set by ZEMA.

Noise

There is less noise at the project site which mostly is background noise. Once the plant is operational, the main source of noise will be crusher plant and movement of utility vehicles and heavy duty equipment such as loaders and forklifts, trucks bringing copper ore and loading copper concentrate and other products and by products. The workers and local communities near the plant could be considered to be sensitive receptors.

Noise levels measured at the site during assessment indicated within (minimum of **39 dBA** at roadside boundary of proposed site) WHO limits of 80dBA 30m away from Mumbwa -kasempa Road and above (maximum of **77 dBA**) WHO Limits on the Mumbwa-Kasempa road when vehicles are passing.

5.6 Hydrogeology

The depth to the groundwater table in the region of the proposed project is generally moderate to low. The Kafue River is situated to the north of the proposed project area and forms part of the main drainage systems within the region (Department of Water Affairs Lusaka & Federal Institute for Geosciences and Natural Resources, Hannover, 2012).

5.7 Hydrology

Surface Water

The proposed project is situated in the Kafue sub-catchment of the greater Zambezi River Basin. The Kafue River is situated to the north of the proposed project area and forms part of the main drainage systems within the region. The actual project area is hilly and there are no rivers or streams.

Surface water sources are limited around the project with no streams or rivers in the vicinity of the site. However, the ground water sources are available especially during the rainy season when the water table rises.

Groundwater

The geology controls the behaviour of the groundwater in such areas as recharge, flow or transitivity etc. The region is underlain by a shallow and a deep aquifer system. The shallow aquifer consists of ferricrete and alluvium material and occurs from surface to depths of 10 mbgl. The deeper, intermediate aquifer is formed by weathered/fractured bedrock and occurs from 40 mbgl to 200 mbgl depth. The deep aquifer beyond 200 mbgl, consists of solid and fractured bedrock at varying intersection depths. The proposed project site is hilly and in the deep aquifer region.

The current potential sources of contamination identified for groundwater in the area included artisanal mining activities especially with the current “gold rush” in the region as well as the contamination from the animals. According to samples of water collected within the site, the parameters analyzed were within the ZABS Standards for Drinking Water making the water fit for human consumption (See attached laboratory certificate in the appendix).

Water and Sewerage

The project area is not serviced by any Sewerage line. The Developer will utilize various water-saving devices to conserve water. The sole aim will be to minimize and contain wastewater, pretreat it before it is discharged into the environment.

5.8 Land Use / Land Tenure

The Land tenure in Zambia is governed by State and Customary ownership. There are two Land tenure systems found in Mumbwa District: (1) Leasehold land tenure system and (2) **Traditional land tenure system**. The Local Authorities through the Commissioner of Lands allocate land to applicants for development on leaseholds basis. The Local Authorities recommend applications for residential, commercial, and agricultural plots.

The area is under Leasehold land tenure system and the proposed land use development for the project area will be primarily copper processing activities. Some portions of the land will be used for the development of infrastructure to support the plant operations.

The site is in HRH Chief Kaindu’s Chiefdom. The major forms of land use in rural community dwellings, farming plots and, natural vegetation/forests. The community in the project area are mainly concentrated along the Kasempa – Mumbwa Road (D181) and in the farming blocks. The road is not in a very good condition but motorable. More than 80% of the land in the project area is under natural forests. The remainder is shared between farming/pastoral grounds and residential dwelling as well as community infrastructures such as schools and health facilities

5.9 Flora and Fauna

5.9.1 Flora Assessment

The woodland in the project area is predominantly the Miombo Woodland. The most common species in this Miombo Woodland within the proposed site are *caesalpinoids Julbernardia paniculata* (mwanda), *Isoberlinia angolensis* (mupopa), *Brachystegia floribunda* (musuba), *B. longifolia* (musamba) and *B. wangermeeana* (musamba), and the *dipterocarp Marquesia macroura* (muvuka).

A variety of smaller trees and shrubs form an under storey, which varies in density and species composition. The grass flora comprises tufted perennials, *Alloteropsis semialata*, *Sacciolepis transbarbata*, *Digitaria gazensis*, *Brachiaria serrata*, *Melinis minutiflora*. There are also, no doubt, later flowering grasses unrecognizable at the time of the survey. Notably absent are tall andropogonoid grasses, *Hyparrhenia* & *Andropogon spp.*, which support hot, destructive fires.

There are no endangered or rare species of trees found in the project area.

5.9.2 Fauna assessment

The proposed project is near the Kafue National Parks and the Mumbwa/Lunga Luswishi GMAs. Because of intense human activities in the project area from human settlement, quarrying/mining, cultivation and illegal hunting of wildlife, fauna is almost currently only seen or encountered occasionally in open areas near the proposed project, except tortoise, rodents, rabbits, and birdlife. The animals are common as one gets closure to the national park. Common mammals in protected areas of Central Province, such as the Kafue National Park and surrounding GMAs, include monkeys (*Cercopithecus aethiops*, *Papio ursinus*), antelopes (*Tragelaphus scriptus*, *Sylvicapra grimmia*, *Cephalophus monticola*, *Tragelaphus oryx*, *Tragelaphus strepsiceros*, *Aepyceros melampus* and *Hippotragus equinus*), Zebra, Lion (*Panthera leo*), Leopard (*Panthera pardus*), Spotted hyena (*Crocuta crocuta*), Wild dog (*Lycaon pictus*), Wild cat (*Felis silvestris*), Otter (*Aonyx capensis*) and Honey Badger (*Mellivora capensis*). Reptile species that occur in the area include representatives of the lizards, chameleons, tortoise and various species of snakes, such Black mamba (*Dendroaspis polylepis*), Black-necked spitting cobra (*Naja nigricollis*), Boemslang (*Dispholidus typus*), and Puff adder (*Bitis arietans*).

Aquatic fauna

According Waterfowl and woodland bird species are common in the project area. Woodland bird species common in the area include kites, Sparrowhawks, doves, and vultures. Common waterfowl species include a wide variety of wild ducks, herons, egrets, and geese.

The Nile crocodile (*Crocodylus niloticus*) and water monitor (*Varanus niloticus*) were also reported to be present in some rivers and streams of the project area.

The streams and rivers in the area have a variety of fish species which are caught by fishermen, although the fish stocking levels are not significant and seriously diminishing. Common fish species include Barbel fish (*Clarias gariepinus*), red breasted bream (*Tilapia rendalli*), dwarf bream (*Taplochromis philander*) and green headed bream (*Oreochromis macrochir*)

All species are neither endangered or rarely threatened species. They are common ones.

Birds and Insects

Birds at the proposed site area were sighted by taking field walks around the site and surrounding areas. Most of the birds were identified on sight and reference was made through desk study literature. The birds observed in the area included the domestic chickens (*Gallus domesticus*) and house sparrow (*Passer domesticus*). The insects observed on site included honey bees (*Apis mellifera*) termites (*Microtermes goliath*) various species of grass hoppers etc. Other notable and observed species of birds on the project area include; black cheeked love bird (*Agapornis nigrigenis*), rock pratincole (*Glareola nuchalis*), spoonbill (*platelea alba*), long- crested eagle (*Lophaetus occipitalis*).

Other birds that are expected on the project area include; western banded snake eagle (*circaetus*

cineroscens), African skimmer (*Rynchops flavirostris*).

SPECIES		IUCN RED LIST STATUS
Ungulates		
Buffalo	<i>Syncerus caffer</i>	Least concern
Bush Pig	<i>Potamochoerus larvatus</i>	Least concern
Common Duiker	<i>Sylvicapra grimmia</i>	Least concern
Hippopotamus	<i>Hippopotamus amphibius</i>	Vulnerable
Oribi	<i>Ourebia ourebi</i>	Least concern
Warthog	<i>Phacochoerus aethiopicus</i>	Least concern
Waterbuck	<i>Kobus ellipsiprymnus defassa</i>	Least concern
Roan Antelope	<i>Hippotragus equinus</i>	Least concern
Sable Antelope	<i>Hippotragus niger</i>	Least concern
Lichtenstein's Hartebeest	<i>Alcelaphus lichtensteini</i>	Least concern
Impala	<i>Aepyceros melampus</i>	Least concern
Bushbuck	<i>Tragelaphus scriptus</i>	Least concern
Greater Kudu	<i>Tragelaphus strepsiceros</i>	Least concern
Eland	<i>Tragelaphus oryx</i>	Least concern
Plains Zebra	<i>Equus burchellii</i>	Least concern
Reedbuck	<i>Redunca arundinum</i>	Least concern
Puku	<i>Kobus vardonii</i>	Least concern
Bushbuck	<i>Tragelaphus spekeii</i>	Least concern
Grysbok	<i>Raphicerus sharpei</i>	Least Concern
Carnivores		
African Wild Dog	<i>Lycaon pictus</i>	Endangered
Banded mongoose	<i>Mungos mungo</i>	Least concern
Lion	<i>Panthera leo</i>	Vulnerable
Side-striped Jackal	<i>Canis adustus</i>	Least concern
Spotted hyena	<i>Crocuta crocuta</i>	Least concern
African civet	<i>Civettictis civetta</i>	Least concern
Leopard	<i>Panthera pardus</i>	Near threatened
Cheetah	<i>Acinonyx jubatus</i>	Vulnerable
Primates		
Chacma Baboon	<i>Papio cynocephalus ursinus</i>	Least concern
Vervet Monkey	<i>Cercopithecus aethiops</i>	
Kinda Baboon	<i>Papio cynocephalus kindae</i>	
Rodents		
Bush squirrel	<i>Paraxerus cepapi</i>	Least concern

Copper Processing Plant - Mumbwa

Mouse	<i>Mastomys</i> spp	Least concern
Porcupine	<i>Hystrix africaeaustralis</i>	Least concern
Other animals species		
Aardvark	<i>Orycteropus afer</i>	Least concern
Elephant	<i>Loxodonta africana</i>	Near Threatened
Hare	<i>Lepus victoriae</i>	Least concern
Pangolin	<i>Manis temminckii</i>	Endangered
Birds		
Abdim's Stork	<i>Ciconia abdimii</i>	Least concern
African Darter	<i>Anhinga melanogaster</i>	Near threatened
African Gray Hornbill	<i>Tockus nasutus</i>	Least concern
African Jacana	<i>Actophilorius africana</i>	Least concern
African Mourning Dove	<i>Streptopelia decipiens</i>	Least concern
African Pied Wagtail	<i>Motacilla aguimp</i>	Least concern
Bateleur	<i>Terathopius ecaudatus</i>	Least concern
Bearded Woodpecker	<i>Thripias namaquus</i>	Least concern
Black-capped Avocet	<i>Recurvirostra avosetta</i>	Least concern
Black-collared Barbet	<i>Lybius torquatus</i>	Least concern
Black-collared eremomela	<i>Leptoptilos crumeniferus</i>	Least concern
Carmine Bee-eater	<i>Merops nubicus nubicoides</i>	Least concern
Cattle Egret	<i>Bubulcus ibis</i>	Least concern
Common Waxbill	<i>Estrilda astrild</i>	Least concern
Crested Barbet	<i>Trachyphonus vaillantii</i>	Least concern
Crested Guineafowl	<i>Guttera pucherani</i>	Least concern
Crested Hoopoe	<i>Upupa epops</i>	Least concern
Crowned Hornbill	<i>Tockus alboterminatus</i>	Least concern
Crowned Plover	<i>Vanellus coronatus</i>	Least concern
Eastern Paradise Whydah	<i>Vidua paradisaea</i>	Least concern
Fish Eagle	<i>Haliaeetus vocifer</i>	Least concern
Nightjar	<i>Scotornis fossii</i>	
Garden Bulbul	<i>Pycnonotus barbatus</i>	Least concern
Glossy Ibis	<i>Plegadis falcinellus</i>	Least concern
Goliath Heron	<i>Ardea goliath</i>	Least concern
Gray Go-away-bird	<i>Corythaixoides concolor</i>	Least concern
Heron	<i>Ardea cinerea</i>	Least concern
Greater Honeyguide	<i>Indicator indicator</i>	Least concern

Copper Processing Plant - Mumbwa

Hadada Ibis	<i>Bostrychia hagedash</i>	Least concern
Lappet-faced Vulture	<i>Aegyptus tracheliotus</i>	Vulnerable
Lilac-breasted Roller	<i>Coracias caudata</i>	Least concern
Malachite Kingfisher	<i>Alcedo cristata</i>	Least concern
Marbou Stork	<i>Leptoptilos crumeniferus</i>	Least concern
Miombo pied barbet*	<i>Tricholaema frontata</i>	Least concern
Open-billed Stork	<i>Anastomus lamelligerus</i>	Least concern
Pale-billed hornbill	<i>Tockus pallidirostris</i>	Least concern
Pied Crow	<i>Corvus albus</i>	Least concern
Pied Kingfisher	<i>Ceryle rudis</i>	Least concern
Red-billed Hornbill	<i>Tockus erythrorhynchus</i>	Least concern
Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>	Least concern
Ring-necked Dove	<i>Streptopelia capicola</i>	Least concern
Sacred Ibis	<i>Threskiornis aethiopicus</i>	Least concern
Saddle-billed Stork	<i>Ephippiorhynchus senegalensis</i>	Least concern
Southern Black Flycatcher	<i>Melaenornis pammelaina</i>	Least concern
Southern Ground-Hornbill	<i>Bucorvus cafer</i>	Least concern
Southern Red Bishop	<i>Euplectes orix</i>	Least concern
Southern Yellow-billed Hornbill	<i>Tockus leucomelas</i>	Least concern
Spectacled Weaver	<i>Ploceus ocularis</i>	Least concern
Spur-winged Goose	<i>Plectropterus gambensis</i>	Least concern
Squacco Heron	<i>Ardeola ralloides</i>	Least concern
Swainson's Francolin	<i>Francolinus swainsonii</i>	Least concern
Village Weaver	<i>Ploceus cucullatus</i>	Least concern
Wattled crane	<i>Bugeranus carunculatus</i>	Vulnerable
White-bellied Sunbird	<i>Nectarinia talatala</i>	Least concern
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>	
White-crowned Plover	<i>Vanellus albiceps</i>	Least concern
White-faced Whistling-Duck	<i>Dendrocygna viduata</i>	Least concern
White-headed Vulture	<i>Trigonoceps occipitalis</i>	Vulnerable
White backed Vulture	<i>Gyps africanus</i>	Common
Yellow Wagtail	<i>Motacilla flava</i>	Least concern
Yellow-billed Stork	<i>Mycteria ibis</i>	Least concern

Note that all the birds mentioned above are common birds no one species is characterised as threatened or endangered later alone Rare.

5.10 Archaeology and Cultural Heritage

There proposed plant area has no known archaeological or cultural heritage. In the event that an archaeological artifact is exhumed, this will be managed as per the provisions contained in the National Heritage and Conservation Act.

Traditional administration is presided over by five chiefs within the district namely HRH Chief Chibuluma, HRH Chieftainess Kabulwebulwe, HRH Chief Kaindu, HRH Chief Moono, HRH Chief Mulendema, and HRH Chief Mumba. The project is in HRH chief Kaindu Chiefdom. Therefore, Chief Kaindu is the one who presides over all traditional and cultural affairs surrounding the proposed site and the other surrounding areas within the chiefdom. The chief is assisted by headmen who are appointed to provide oversight over traditional affairs within the respective villages. The project area falls in chief Kaindu's area and Musaka Jikubi is the traditional ceremony practiced in the area and is held in September.

The project site, however, is in the big concession farm block which is state land hence there is no headman appointed in the area. There are no significant historical or archaeological features within the zone of influence.

5.11 Traffic volume

Mumbwa-Kasempa road is most of the times in a deplorable state owing to the heavy traffic of vehicles carrying agricultural produce and inputs. This road is important to communities living in Kaindu, Kalwanyembe, Mpusu and Kitumba areas. Members of the communities get most of their household necessities and inputs from the Mumbwa Central Business district which is located approximately 45km from the proposed project area and is accessible through the Mumbwa-Kasempa Road. There will be an increase in traffic volumes on these road once the plant becomes operational.

5.12 Socio-economic conditions

5.12.1 Population of Mumbwa District

The site falls under Mumbwa District which can be described as a rural area with most of the nearest locations having people engaged in farming activities as well as some employed formerly in the mines operating in the area. Others have their livelihood from informal dealing in precious minerals.

According to CSO, 2010 Census of Population and Housing Demographic Projections projects the 2021 population for Mumbwa District to be 339,736 out of which 49.99% are male and 50.01% are female (Central Statistics Office, 2013). Compared to the 2010 Census of Population and Housing which was 226,171, the 2021 projected population figures represent 50.21% increase in population. The 2010 population of Kalwanyembe Ward where the project site is located was 8,401 (Central Statistics Office, 2010). The figure below shows the populations in the project catchment area.

The population of the male and female in Mumbwa district are almost the same. According to the 2010 census of population and housing population projections, the female makes up 50.01% of the population while the males make up 49.99% of the population. Approximately 86.28% of the population Mumbwa District lives in rural areas while approximately 13.72% of the populations live in the urban part of the district. A regards population distribution by age, there are more people aged 35 years and below in Mumbwa District.

5.12.2 Development surrounding plant site

Being a farming area, the built environment around and near the project site mainly consists of isolated housing units within individual's farms. Below is what constituting the built environment near the project.

- Kitumba Community School and staff houses within 3.3km radius from the project site
- Sugar loaf shopping complex is constructed approximately 3.5 km from the project site
- Kitumba Correctional Facility approximately 6km from the site
- Kitumba Rural Health Post approximately 6km from the project site.

5.12.3 Economic Activities

The most dominant source of livelihood for the population in Mumbwa and the project area is subsistence and commercial agriculture. However, most of the households living near and around the project area practice subsistence farming. By virtue of the proposed project site being in the big concession farm block, it is surrounded by farms. Maize is the major crop which is grown by households in the project area and Mumbwa District as a whole. Other crops grown include groundnuts, beans, sweet potatoes, and sunflower. Animals like chickens, goats and cows are kept.

Economic activities taking place around the project area are mainly agricultural and mining related. Apart from the several households engaged in subsistence farming, Amatheon Agri Limited has large mixed farming operations within the big concession area. Mining related activities taking place in the area are mostly mining explorations. Among the companies with exploration licences in the area include Intrepid Mines Zambia Limited. Charcoal burning is another economic and livelihood activity practiced by many households in the area.

5.12.4 Education

Mumbwa has 144 primary schools and 15secondary schools which are used to deliver education services to the population in the district. There are two schools around the project area namely Kitumba community school offering grade 1 to grade 7 classes and Kalenda Primary School offering grade 1 to grade 9 classes. The closest of these schools is Kitumba Community School located within 300m radius from the proposed project location. There is only secondary school in Kalwanyembe ward namely Kaindu Secondary School. This school is located approximately 27km from the project area. Kitumba Community School, the school closest to the project location cited inadequate classrooms and teachers houses, low staffing levels, inadequate learning materials and poor road network to be the major challenges in a bid to provide quality education services. The literacy levels around the project area are estimated at 30%.

5.12.5 Health Facilities

Health services are accessed through the thirty-four health facilities located in various settlements within Mumbwa (Health, 2020). Out of the thirty-four health facilities, there is one district hospital and one mission hospital. The remainders are rural health posts and rural health centres. The population living around the project area access their health services from Kitumba Rural Health Post located approximately 2km from the proposed project site and Kalenda Rural Health Post located approximately 11km from the proposed project site.

Malaria, upper respiratory tract infections non pneumonia and diarrhoea non-bloody are among the top five most prevalent diseases in the project area. However, Malaria and diarrhoea are mostly seasonal. Malaria cases are most prevalent during the rainy season while diarrhoea cases are most prevalent during the hot season. The high prevalence of upper respiratory tract infections has been attributed to poor housing while diarrhoea cases have been attributed to poor hygiene and inadequate access to clean and safe drinking water. The table below shows the top ten causes of morbidity in the area arranged in chronological order starting with the most prevalent diseases.

S/N	Disease
1	Upper respiratory tract infection – non pneumonia
2	Diarrhoea – non bloody
3	Malaria
4	Digestive system – non-infectious
5	Muscular skeletal and connective tissues – non trauma
6	Trauma and other injuries
7	Sexually transmitted diseases (STIs)
8	Skin diseases – non-infectious
9	Eye diseases
10	Pneumonia

The average HIV positivity rate is approximately 1%. A comparison of the population the population of the project area which is approximately 2,600 and statistics of the population on ART treatment shows that the HIV/ AIDS prevalence rate is approximately 1.62%. Among the interventions put in place to mitigate HIV/ AIDS by Kitumba Rural Health Post include the following:

- Distribution of condoms
- Giving pre-exposure prophylaxis (PREP) to the population at risk of contracting HIV.
- Giving post exposure prophylaxis to the victims of rape or those who suspect to have been exposed to the HIV virus.
- Roll out of the test and treat programme
- Mother to child HIV transmission prevention

5.12.6 Energy

The District has great potential for development of the energy sector through solar plantations.

Currently, a solar plantation is underway and would be critical in addition to the current energy demand both locally and for export. There is potential in the energy subsector particularly in relation to solar energy production because of huge pieces of land available in the District.

5.12.7 Transport and Communication

The project site is accessible by districts in central province and western province through the Mumbwa Landless Corner Road (M20) and the Lusaka – Mongu Road (M9) respectively. Most of the roads in the district are gravel roads connecting various settlements and farming areas and these roads are mostly in poor condition. The major road passing through the project area is the Mumbwa-Kasempa Road (D180). This road is a gravel road and generally in bad condition. The other road is the Kaindu– Mpusu Road which is a gravel road and in poor condition as well.

Telecommunication network around the project area is generally poor because of intermittent connectivity. However, MTN network is accessible in most of the areas within the project area

5.12.8 Water Supply and Sanitation

Areas around the Mumbwa central business district are connected to piped water supply provided by the Lukanga Water Supply and Sanitation Company. Disposal of faecal matter around Mumbwa central business district and the immediate surrounding settlements is through septic tanks. Lukanga Water and Sanitation Company does provide the sewer services through emptying of septic tanks and disposal of the faecal matter at their oxidative sewer stabilization ponds.

The main source of water in Kitumba area are boreholes. Disposal of faecal matter is mainly through pit latrines except for a few installations such as the newly constructed houses for the Kitumba Correctional facility where disposal of faecal matter is through septic tanks.

5.12.9 Potential Resettlement and Compensation

At the plant site there are no settlements whether illegal or legal as the land belonging to CML. The proposed DEVELOPMENT will not affect households or dwellings surrounding the project Area.

6

POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MITIGATION MEASURES

6. POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MITIGATION MEASURES

A number of environmental issues were identified during the scoping process and the EIA study. The purpose of this section is to predict and make an assessment of the impacts on the environment that may potentially arise as a result of the operations of the plant. Impacts that could occur are grouped and discussed below under the headings of the various environmental components or receptors that are likely to be affected by the implementation of the project.

An assessment of the general significance of these impacts based on significance and likelihood is made on the basis of information gathered during the scoping process, the environmental baseline study of the plant area which included several plant visits by respective experts, as well as a desk study of relevant existing documents and information pertaining to the study and information describing the nature and design of the proposed project. The possible environmental impacts related to the project are discussed in this section: -

The key environmental issues of concern have been referred to in this chapter and the mitigation measures are incorporated in the environmental management and monitoring section of this report.

6.1 Positive Impacts (Socio – economic impacts)

6.1.1 Employment Opportunities

The facility currently will provide between 300-450 direct employment opportunities. A permanent workforce is proposed at 70. The proposed plant will have skilled personnel and crafts people as well as un-skilled labor and will offer many employment opportunities. Furthermore, indirect opportunities for employment are stimulated in the other sectors related to operations, such as manufacturers and suppliers of local raw materials and finished products and providers of services. Maintenance phases will also create indirect employment opportunities for locals especially for semi-skilled labor such as brick layers, steel fixers, carpenters, supervisors, and sub-contractors.

6.1.2 Improved Aesthetics of the area

The proposed plant will contribute to the development of the Mumbwa's industrial development by providing impressive scenery and contributes to a positive aesthetic outlook of the surrounding built environment in Mumbwa District.

6.1.3 Increased Public revenue

The proposed plant will pay revenue and taxes thus increase revenue and taxes for both the central and local authorities. This includes scrutiny fees for the local planning authorities (MTC) and other indirect taxes resulting from the construction project such as VAT on materials and services, PAYE as well as revenue to pension funds such as NAPSA.

6.1.4 Multiplier Effect

The developer will enhance local participation throughout the various phases of its construction and

operation by focusing on local suppliers, employees, and consumers and intends to maximize the multiplier effect on the Zambian economy.

6.2 Negative Impacts (Preparation/Construction/Operation Phases)

This particular project is expected to have some negative environmental impacts and these are:

6.2.1 Direct impact on localized land and soil (construction and Operation)

Destabilized soils could result in soil erosion due to storm water runoff during periods of heavy rainfall which could have an effect in the long run.

All earthworks for maintenance will be carried out during the dry season and the permanent storm water, road and site drainage system will be in place before the onset of the following rains.

Hydrocarbon/Oil Leaks and Spills

Oil/grease spills are noted to be prevalent during construction and operations on the site; dealing with petroleum products. Such products contain detrimental elements to the environment since they contain traces of heavy metals such as; mercury, lead and sulphur among others. It is wise to control and observe the little that could occur especially during maintenance of the involved machinery.

Mitigation measures

Storage area in process for hydrocarbons and organic solution shall be equipped with smoke detectors and chemical fire extinguishers to deal with an eventuality. Clear signs of “NO SMOKING” and NO NAKED LIGHTS” shall be displayed prominently for safety reasons. Appropriate earthing and lightening arresters shall be installed. Storage of hydrocarbons not in process shall be limited to 210 liters at any one given time. A fire emergency procedure shall be developed and implemented during operation phase

6.2.1.1 Impacts on biological existing environment (fauna and flora)

The site is already a cleared site with an already existing operational plant. In comparison to surrounding areas, impacts on utilization of natural resources within the project area will be mitigated through good plant practices and replanting of exotic plants within the plant.

Impact on Biodiversity

Construction Phase

The site is to be cleared site and only the areas needed for construction will be cleared thus little to no global significance has been identified and no much impact on biodiversity.

Mitigation measures

- ✓ Good practices that protect biodiversity.

Impact on Fauna

Construction activities will result to loss of fauna due movement of heavy equipment. Operation of the plant will have little to no impact on fauna

Mitigation measures

CML commits to notify the National Park and Wildlife Department should any fauna be noticed on the proposed plant.

Introduction of Alien species

All workers are sensitized not to carry or introduce alien species (plants or otherwise) into the proposed plant area which contaminate water bodies, so as to avoid alien species invasion in the area. Inspections should also be done to ensure that no seeds or plant remnants of these invasive species are carried on equipment being transferred from other areas to the project site.

The developer will monitor the trees that are replanted on site ensuring that no alien species are planted on site

6.2.1.2 Impacts on risk of fire

There are some operations that may pose a risk to fire occurrences at the proposed plant. These occurrences may arise during both construction especially fuel storage area and operation phases since there will be extensive use of electricity in the facility. High risk of fire is also expected due to the flammability of the products (petrol, diesel) handled at the site. It should therefore be ensured that all operations during operational phases are in tandem with the Fire Risk Reduction Rules.

6.2.1.3 Impacts of the facility will have on the business within the vicinity of the proposed project site

Local businesses around the area will have easy access to the commodity but provide competition to other companies producing the same commodity.

6.2.2 Impact on Noise (construction and Operation)

Preparation and Construction Phases

Noise from constructing machinery; however, considering that the area is navigated by busy main roads, additional noise from construction traffic around the area could be enhanced.

Operation Phase

Potential sources of noise at operation stage will include:

- **Noise from increased traffic**

The increased volume of traffic to the area will result in an increased background noise level, especially during peak times. However, given that the site is located next to existing busily trafficked Mumbwa- Kasempa road, it is not considered that the impact of noise from the additional traffic will be significant.

Faulty operation equipment will not be allowed to operate on the site to ensure quiet operation. Earmuffs shall be provided to personnel working in or near noise environments.

Public liaison through the management will be an integral part of CML management in order to avoid potential conflict with surrounding developments and neighboring residential areas as regards the activities of the development. Prior notice will be given in good time of impending activities that may potentially cause disturbance to surrounding residential areas.

6.2.3 Impact on Air quality (Construction and Operation)

- **Dust releases and nuisance**

Construction activities such as clearing of the land, excavation, and movement of heavy equipment will result into increased dust levels at the proposed site. Bare surface areas with loosened topsoil combined with the operation of machinery such as trucks, folk lifts will increase dust raised from the site. Dust will be raised during the off-loading of materials (copper ore) delivered to the site; the preparation of the foundations will require the importation of raw materials.

Crushers at the proposed Plant once operational will be a source of air pollution; particulate matter, and dust are mostly emitted.

- **Exhaust nuisance**

The operation of machinery will result in an increase in the levels of air pollution within the site due to exhaust fumes although the impact of this will be localized and is considered moderate to small. The surplus impact of exhaust fumes from operational vehicles will generally be very small. Levels of such exhaust pollution will depend highly on the maintenance and condition of the equipment and vehicles at and coming to the site. The proponent shall ensure all vehicles are properly serviced to avoid unnecessary fumes during construction works.

Mitigation measures

The ground will be dampened with water to simmer down dust on working the ground. Trucks ferrying the waste materials will be covered by tarpaulins to mitigate the impact. Water shall be sprayed along the ramps, access roads and open spaces using a water bowser. Appropriate protective clothes such as dust masks, goggles and work suites shall be provided to workers operating earth moving machines and dumping supervisors. New employees shall be inducted on safety requirements when working in dust prone areas and safety talks shall be conducted frequently. Signs shall be installed to educate workers about the health dangers of inhaling small particles of dust. Annual medical check-ups shall be conducted to determine the levels of dust exposure to workers. Ambient dust around the plant area shall be monitored monthly to ensure that the dust fall-out around is below the ZEMA limit of 250 mg/m²/day

6.2.4 Solid Waste generation (Construction and Operation)

Solid waste is expected to be generated at all stages. Waste that will be produced on the site includes building rubble, iron cuttings as well as worker's domestic garbage mainly biodegradables such as food stuff and non-biodegradables (such as plastics).

The following Solid Waste Management protocols will be followed:

- Proper housekeeping will ensure that all parts of the site are at all times clean and tidy. Bins will be provided throughout the development for the deposition of litter.
- Designated covered areas will be provided for the storage of normal solid waste arising within the project area.
- An approved waste removal company will be contracted by the developer to collect un-recyclable solid waste for disposal at an approved refuse dumping site in accordance with Section 63 of the EMA No. 12 of 2011.
- All hazardous wastes, material soiled with hazardous wastes and empty containers of

hazardous materials shall not be disposed of on site. All such waste shall be stored on site in an approved manner, and be removed at regular intervals to offsite waste disposal facilities designed to handle such hazardous waste as required by law (Hazardous Waste Management Regulations SI No. 112 of 2013 Regulations 18 - 30).

6.2.5 Generation of sewage (Operation)

The main source of sewage is from offices and production units. The following measures are ensured;

- All sewage will be directed/connected to the effluent treatment system;
- Proper sanitary system will be put in place
- Effluent from the plant will be discharged directly to the effluent treatment plant.

6.2.6 Impact on ground water – abstraction related (construction and Operation)

It is not considered likely that the water requirements of the proposed plant will result in over abstraction of ground water that could result in reduced availability to other users or have detrimental effects to the aquifer.

Borehole abstraction will be monitored for the proposed facility. Only required amounts shall be drawn and storage tanks will be mounted to ensure conservation of water. The reticulation system will be automated to only draw water when reservoirs go below a preset minimum level.

6.2.7 Impact on Traffic and Road Safety (construction and Operation)

The major road around the plant is Mumbwa-Kasempa road. Currently private vehicles, trucks and minibuses use Mumbwa- Kasempa road for public transport. When the Plant starts to operate, there is little possibility of increase in traffic volumes on the Mumbwa- Kasempa road.

6.2.8 Occupational Health and Safety (Construction and Operation)

● Safety risks

Construction and Operations phases at the proposed plant involve potentially risk levels to the occupational health and safety of workers and personnel. The nuisance of dust and the movement of vehicles around the site may impact on the health of workers. Potential risks include working at heights with scaffolding platforms, welding, cutting, and on site handling of machinery.

Other risks may include explosions, fire, hazardous situations arising from process designs etc.

Strict adherence to safety measures and procedures will minimize (or eliminate) risks of accidents occurring and ensure healthy and safe conditions for all persons working on the site. Adherence to engineering regulations and standards would eliminate structural failure.

Safety arrangements shall include:

- ✚ All Fire Fighting equipment such as fire extinguishers and hydrants will be checked and serviced regularly to ensure that they are always in full working order.
- ✚ Personnel shall be trained in fire procedures and assembly points. Fire drills will be conducted based on the Emergency Response Plan.
- ✚ Personal Protective Clothing (PPE) shall be issued and used as required by the various

classes of the workforce e.g. gloves and aprons for cleaning and housekeeping, earplugs and/or overalls, respirator and face shield etc.

- **Health risk**

The dust raised during various plant activities and exposed worksites can pose a nuisance to workers or adjacent communities. Impacts are potentially significant if unmitigated and can lead to either chest or eye irritations.

The developer shall comply with the Zambian Construction Health and Safety Standards. These include provisions of:

- Factories Act. Cap. 441,
- Workers Compensation Act

In addition, the developer shall ensure that all employees, subcontractors, suppliers and visitors are made aware of and comply with safety rules and measures that will apply on site, and is responsible for conducting the necessary trainings of personnel. The developer shall take reconnaissance of safety regulations in order to avoid unsafe/disruptive actions on site.

6.2.9 Impacts on Archaeological/Historical/Cultural sites (Preparation)

The proposed plant site does not contain known historical, pre historical or archaeological or scientific interest.

Any such features that may be discovered that were not apparent on surface investigation will be reported by the Developer and applicable procedures will be followed.

6.3 The Evaluation of the Impacts Significance

The assessment of the issues has been conducted according to a synthesis of criteria required by the integrated environmental management procedure defined as follows:

6.3.1 Nature of the Impact

This is an appraisal of the type of effect the plant activities would have on the affected environmental component. Its description includes what is being affected and in what way. This includes both the positive and negative.

- **Direct Impact** - These are impacts that are typical, inevitable, and predictable. They are caused directly during implementation of project activities.
- **Indirect Impact** - These are reasonably foreseeable and probable impacts that are caused by facility direct and indirect effects. The impacts may occur at some future time after direct effects and will be located within the boundaries of the systems affected by the plant.

6.3.2 Duration

The lifetime of the impact is measured in the context of the life-time of the proposed development.

- **Short term** - the impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase.

- **Medium term-** the impact will last for the period of the construction phase, thereafter it will be entirely negated.
- **Long term** -the impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter.
- **Permanent** -the only class of impact which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

6.3.3 Intensity

A description of whether or not the intensity (magnitude) of the impact would be high, medium, low or negligible (no impact). An attempt will be made to quantify the impacts on components of the affected environment will be described as follows: Is the impact destructive, or benign? Does it destroy the impacted environment, alter its functioning, or slightly alter it? These are rated as follows:

- **Low** - where the impact will not have significant influence on the environment, and this will not be required to be significantly accommodated in the project design or implementation; the impact alters the affected environment in such a way that natural processes of functions are not affected in any significant way.
- **Moderate** - where it could have an adverse influence on the environment which would require modification of the project design or alternative implementation schedules; the affected environment is altered, however, function and process continue, albeit in a modified way.
- **High** - where it could have significant influence on the environment but cannot be mitigated or be accommodated by the project environment by introducing alternative mitigation measures such as realignment at a particular stretch or adoption of different design measures.

6.3.4 Probability

This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:

- **Unlikely** - the probability of the impact occurring is very low, due to the circumstances, design or experience.
- **Possible** - the impact could possibly happen, and mitigation planning should be undertaken.
- **Probable** - it is most likely that the impact will occur at some or other stage of the development. Plans must be drawn up before the undertaking of the activity.
- **Improbable** - it is not likely that the impact will occur at some or other stage of the development.
- **Certain/Definite** - the impact will take place regardless of any prevention plans, and

only mitigatory actions or contingency plans can be relied on to contain the effect.

6.3.5 Severity

This describes whether the severity (harshness / gravity) of the impact would be high, medium, low or negligible (no impact). The severity of the impact will be qualitatively determined on the components of the environment to be affected by taking into consideration the following questions. Is the impact harsh, serious, or dangerous? Does it degrade the impacted environment, alter its functioning, or slightly modify its natural state? These are rated as follows:-

- **Low** applies where the impact is very little and will not have significant influence on the environment. This will not be required to be significantly accommodated in the project design or implementation and the impact changes the affected environment in such a way that natural processes of functions are not affected in any significant way;
- **Moderate**, applies where the impact could have an adverse influence on the environment and would require some modification of the project design or alternative implementation schedules. In this regard, the affected environment is altered while the function and process continue, albeit in a modified way; and
- **High**, applies where the impact could have significant influence on the environment but cannot be mitigated or be accommodated by the project environment by introducing alternative mitigation measures such as realignment at a particular stretch or adoption of different design measures. In this regard, the function or process of the environment is disturbed to the extent where it temporarily or permanently ceases.

6.3.6 Sensitivity

The sensitivity of the element being impacted would be regarded as being high, medium, low or negligible (no impact). An effort will be made to determine the qualitative sensitivity of the element of the environmental components being impacted upon due to the proposed development. Is the reaction of the environmental component due to the impact acceptable or not? Does it destroy the impacted environmental component, alter its functioning, or slightly alter it?

- **Low**, where the sensitivity of the element being impacted will not have significant influence on the environmental component, and this will not be required to be significantly accommodated in the project design or implementation. The impact to the affected environment will be in such a way that natural processes of functions are not affected in any significant way;
- **Moderate**, where the sensitivity of the element being impacted could have an adverse influence on the environmental component, which would require modification of the project design or alternative implementation schedules. The affected environment is altered while the function and process continue and the albeit in a modified way; and
- **High**, where the sensitivity of the element being impacted could have significant influence on the environmental component but cannot be mitigated or be accommodated by the project environment by introducing alternative mitigation

measures such as realignment at a particular stretch or adoption of different design measures. The function or process of the environment is disturbed to the extent where it temporarily or permanently ceases.

6.3.7 Determination of Significance

Significance is an indication of the importance of the impact in terms of physical extent, intensity and time scale, and therefore indicates the level of mitigation required. Usually the community is involved in provision of information and determination on the characteristics of the impacts and the significance is determined based on this information.

The classes are rated as follows:-

- **Negligible**, the impact is not substantial and does not require any mitigatory action, Low, the impact is of little importance, but may require limited mitigation,
- **Moderate**, the impact is of importance and therefore considered to have mitigation. Mitigation is required to reduce the negative impacts to acceptable levels or positive impacts maximised,
- **High**, the impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential. Positive impacts should be enhanced as a priority.

From the baseline information assembled in the previous chapter coupled with the information gained during the consultation stage, the expected environmental impacts can be categorised into positive and negative impacts.

In addition, it is important to consider the duration of the impact and at what phase of the project it occurs, i.e. impacts during site preparation phase or impacts over the life of the project (operational phase) and whether the impacts are direct (i.e. removal of vegetation) or indirect (increased sexual diseases as a result of the improved wages).

The evaluation of impacts using these criteria is presented in Table 6 on the next page:

6.3.8 Significance Ranking Matrix

Table 6.1 Significance

CONSEQUENCE (Magnitude Geographic Extent Duration of impact)															
LIKELIHOOD (Frequency of activity Frequency of impact Sensitivity)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 6.2: Positive/Negative Mitigation ratings

Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very High	126-150		Propose mitigation measures
High	101-125		Propose mitigation measures
Medium-High	76-100		Propose mitigation measures
Low-Medium	51-75		Maintain current management
Low	26-50		Maintain current management
Very low	1-25		Maintain current management

Table 6.3: Impacts on the Bio-Physical Environment (Operational Phase)

Impacts on Air Quality	
Deterioration in air quality due to increased traffic exhaust emissions, odour from solid waste and fugitive dust	
Magnitude of impact	4
Geographic extent	3
Duration of impact	2
Frequency of activity	4
Frequency of impact	4
Sensitivity of element	2
Result	Medium-High (-88)
Comment/ Mitigation	
<ul style="list-style-type: none"> • All discharges to air from kitchens will be screened through kitchen hoods, filters, and extraction fans to ensure compliance with local building regulations. • Proper house cleaning and management of solid waste will ensure the risk of odour due to the accumulation of refuse is minimal. • All walkways and driveways will be paved, while other areas will be landscaped and planted with flowers or grass and hence no dust release is envisaged 	
Deterioration in air quality due to increased traffic exhaust emissions, odour from solid waste and fugitive dust	
Magnitude of impact	1
Geographic extent	2
Duration of impact	1
Frequency of activity	1
Frequency of impact	2
Sensitivity of element	1
Result	Very Low (-12)
Impacts of Noise on the Environment	
Magnitude of impact	2
Geographic extent	2
Duration of impact	3
Frequency of activity	3
Frequency of impact	4
Sensitivity of element	2
Result	Low -Medium (-75)
Comment/ Mitigation	
The site is located along T2 Kabwe road from which noise levels equivalent to what may result from additional traffic to be attracted by the proposed facility are already experienced, and hence expected to have a corresponding effect	
Noise pollution from plant construction and operation and traffic movement	
Magnitude of impact	2
Geographic extent	1
Duration of impact	1
Frequency of activity	1
Frequency of impact	3
Sensitivity of element	1
Result	Low (-20)

Table 6.4: Evaluation of Impacts

Phase	Description of Impact	Type of Impact	Spatial Extent	Frequency	Duration	Intensity	Severity	Probability	Sensitivity	Determination of Significance
Improved Aesthetics of the area										
All phases	Enhanced aesthetics of the project area by improving the landscaping and general cleanliness of the site.	Indirect/ Direct	Site	More than twice	Long term	Moderate	Moderate	Probable	Moderate	High
Boosting supplying sector										
All phases	Positive boost to the local and national economy through its multiplier effect	Indirect/ Direct	Site	More than twice	Long term	Moderate	Moderate	Probable	Moderate	High
Employment and enhance services										
All phases	Employ people during all the phases of the project.	Indirect/ Direct	Site	More than twice	Long term	Moderate	Moderate	Probable	Moderate	High
Improved local Economy										
All phases	Impacts on the local economy due to alternative income generating activities, increased employment levels, influx of people to the area, land use changes, increased purchasing power.	Indirect/ Direct	Site	More than twice	Long term	Moderate	Moderate	Probable	Moderate	High

Copper Processing Plant - Mumbwa

Impacts on Water Quality										
All phases	Storm water Water pollution (underground and surface) Increased runoff and solid waste storage	Indirect	Local	More than twice	Long term	Moderate	Moderate	Probable	Moderate	Moderate
Impacts on Air Quality										
Construction	Temporary air pollution due to dust generated by excavation, vehicle traffic and transportation of construction materials and fumes from vehicles	Direct	Local	More than twice	Short term	Moderate	Moderate	Possible	Moderate	Moderate
Operational	Particulate matter, Fugitive emissions and dust from crushers due to operations.	Direct	Site	More than twice	Long term	Moderate	Moderate	Probable	Moderate	Moderate
Impacts on Noise										
All phases	Noise from increased traffic.	Indirect	Site	More than twice	Long term	Low	Moderate	Possible	Moderate	Moderate
Impacts of Traffic and road safety										
All phases	Increased noise levels.	Indirect	Site	More than twice	Long term	Moderate	Low	Possible	Low	Low

Copper Processing Plant - Mumbwa

Impacts of occupation health and safety

All phases	Workers could be in danger of accidents from machinery such as excavators etc	Direct	Site	More than twice	Medium	High	Moderate	Possible	Moderate	Moderate
-------------------	---	--------	------	-----------------	--------	------	----------	----------	----------	----------

Copper Processing Plant - Mumbwa

Table 6.5: Summary of Potential Impacts and their Mitigation Measures

No.	Environmental Impact	Source of Impact	Potential Impact	Proposed Mitigation Measures
1.	Impact on soil	<ul style="list-style-type: none"> During site Preparation and construction 	<ul style="list-style-type: none"> Altering the topography of the area. Destabilized soils could result in soil erosion due to storm water runoff during periods of heavy rainfall which could have an effect in the long run. 	<ul style="list-style-type: none"> The clearing of land shall take place. However, all earthworks for site preparation and levelling and preparation of the platform will be carried out during the dry season and the permanent storm water, road and site drainage system will be in place before the onset of the following rains
2.	Air quality deterioration due Dust	<ul style="list-style-type: none"> During site Preparation and construction 	<ul style="list-style-type: none"> Dust from site preparation and construction works phase and from vehicle movements around the site; Dust from removal of top soil and excavation of trenches for tanks; Dust from the cement and aggregate during construction; Worker exposure to dust 	<ul style="list-style-type: none"> Watering the site at regular intervals during the site preparation and construction phases of project implementation; Respirators shall be used to protect employees;
3.	Solid Waste generation	<ul style="list-style-type: none"> During all the stages of the project 	<ul style="list-style-type: none"> Degradation of soil and general environment 	<ul style="list-style-type: none"> Institute solid waste management by having designated bins and engaging a company for collection; Having designated points for the disposal of waste; Separation of biodegradable from non-biodegradable waste. Waste will be separated into the four categories hence reducing the environmental load by minimizing actual waste being Biodegradable; Plastics; Glass and bottles; and Cans and metal. Minimizing solid waste through effective and efficient operations on site of the service station Operations during and after the construction phase of project implementation;

Copper Processing Plant - Mumbwa

				<ul style="list-style-type: none"> Waste will be kept to minimum levels by efficient and effective operations on site; A system will be put in place to ensure that there is proper storage of the waste so that even in the event of potential delay in collection, the waste is properly contained; Vehicles carrying waste should be covered as they transport the waste to designated dumping sites; Mixing of stones and cement will be done at one point of the site to be identified by the qualified surveyors and constructors in order to avoid contaminating the whole area.
4.	Generation of sewage.	<ul style="list-style-type: none"> From site offices 	<ul style="list-style-type: none"> Contaminating surface water and underground water 	<ul style="list-style-type: none"> All sewage will be directed/connected to the effluent treatment system; Proper sanitary system will be put in place Sewage from the development will be discharged directly to the existing trunk main
5.	Safety and Risk of Workers	<ul style="list-style-type: none"> Accidents during Site preparation; Construction; and Injury / loss of life from accidents 	<ul style="list-style-type: none"> Loss of life 	<ul style="list-style-type: none"> Ensure that all workers are briefed on potential hazards and necessary safety precautions; Implementation of emergency procedure on site; Use of clearly labelled signage during and after the project construction phase; Proper control and directing of on and offloading traffic during construction phase;
6.	Traffic and Parking	During operation stage of the project	<ul style="list-style-type: none"> Increased traffic loads. 	<ul style="list-style-type: none"> There is enough room for a good car park.
7.	Noise Pollution as a result of vehicular	<ul style="list-style-type: none"> Construction and Operational stages 	<ul style="list-style-type: none"> Disturbing surrounding community 	<ul style="list-style-type: none"> Works will be done in an enclosed or barricaded area as per construction rules;

Copper Processing Plant - Mumbwa

	movements to and fro during construction and operational activities;			<ul style="list-style-type: none"> • Ensuring proper regulation of working hours. • Regular servicing of vehicles
8.	Health and safety of workers	<ul style="list-style-type: none"> • Construction phase 	<ul style="list-style-type: none"> • Chronic illnesses leading to Loss of life 	<ul style="list-style-type: none"> • Implement a safety and health policies designed to identify, evaluate, monitor and control health hazards and provide safety training; • Put in place a health scheme for the employees; • Ensure that employees are regularly trained and drilled to fire fighting and safety techniques; • Provide adequate ablution facilities for all employees and change rooms facilities; and • Provide hygienically prepared meals for all employees.



APPROACH AND METHODOLOGY

7. DESCRIPTION OF METHODS USED IN DATA COLLECTION

7.1 Introduction

This section refers to various study tools that were adopted for each element of EIA study like literature review, understanding prevalent environment of the study area, data collection and data analysis approach, transect and socio-economic study, and Geographic Information Systems (GIS) mapping using drone-imagery.

7.2 Methodology

For the preparation of detailed EIA, ESEC LTD team collected the necessary information through field assessments, government authorities, and carried out public consultations. The team developed communication links with appropriate personnel of the CML and other relevant key entities with the objective of progress of proposed assignment in a timely manner.

The scope of the study is to describe the project and evaluate all the possible positive and negative environmental impacts in order to propose the mitigation measures necessary to reduce the effect of the identified negative impacts. Data has been collected from different sources which is then analyzed and synthesized to understand prevalent environment, identify impacts, and thereby propose adequate management plans.

7.3 Data Collection

Literature review that was partially carried out during Scoping Report preparation has been continued for the EIA study. The prime objective is to:

- Review of existing studies, environmental legislation, environmental and social surveys, and technical documents relevant to sewerage connection;
- Collect any data required to meet requisites of the approving authorities, e.g. ZEMA and World Bank.
- The team collected required information from different government departments, academic institutions (universities), public agencies, research institution, authorised websites, etc. The collected information (policy documents, published books, journals, and census data) has been reviewed by the team for better understanding of project area, environment, sensitiveness, and socio-economic structures.

The baseline data was collected in order to describe the existing environment. Data collection included an inventory of biophysical environment, conducting interviews with stakeholders and reviewing of relevant literature. Information on names of geographical features were checked from maps and confirmed by interviewing key local informants who were conversant with the area and specific details.

The inventory of the existing physical and biological environment on the facility focused on quality, quantity, density, and distribution. The mapping of the existing surrounding industries was undertaken to map out the surroundings of the plant area in order to determine the location of the proposed development in relation to any existing critical installations and developments that would be affected by the project. In doing so, the existing environment was categorized into physical, social and biological environments. Specialized studies were conducted to assess possible impacts on air, soil and water. Existing Baseline Data: Review of relevant published data, including previous EIAs and Environmental monitoring data. Sources of baseline data and all key documents, which have been used for this EIA, are listed in the appendices.

Biophysical Environment: Vegetation has been partially cleared for installation of ZESCO transformer as the area is a designated industrial area thus rendering the area into a sterile environment. As for species identification the following were considered: Leaf composition, leaf type, leaf variation and plasticity, branch shape and stems. The Species diversity, Abundance, Population, and Evenness of the trees within the area was not conducted as the plant is within an already existing industrial area which is already cleared of plants and no trees will be cut.

Fauna and avifauna at the proposed plant site area were sighted by taking field walks around the site and surrounding areas. Little or no birds were identified on sight and reference was made through desk study literature.

Baseline Surveys: Where baseline data was considered to be potentially insufficient (such as, out of date, lack of seasonality considerations, too narrow scope) for the current EIA process, new baseline surveys were conducted and additional primary data collected. Project baseline surveys included socio-economics.

7.4 Mapping

GIS maps are prepared to illustrate the climatic conditions; land use & land cover patterns, historical sites, geological formations, routes for laying pipelines, and other related parameters. The mapping is based on geographical coordinates collected during field surveys, consultations and while some are based on data available from satellite images and authorised websites.

7.5 Scoping Phase

ESEC LTD team visited the project site several times and interacted with various stakeholders such as CML Staff, ZEMA and other regulatory authorities for conducting the preliminary investigations to define the scope and formulating Terms of Reference (ToR) for the detailed EIA study. The stakeholders had been identified through a detailed stakeholder identification and mind-mapping process in discussion with CML and ZEMA during the inception phase and document review. The findings of the preliminary assessment had been recorded and documented as the Scoping Report along with the ToR, which was submitted to ZEMA by the Consultant for approval in September, 2022.

7.6 Preparation of EIS

CML through the ToR has described a list of significant tasks that needs to be undertaken by the Consultant to prepare a comprehensive and detailed EIA. The tasks are as follows:

i. Legislative and Regulatory Framework

ESEC LTD studied the relevant legislation and policies at National, Regional, and Local levels from secondary data sources. The World Bank operational policies are also studied and analyzed to streamline the policies that are triggered by the operations of CML.

ii. Environmental and Socio-Economic Baseline Study

ESEC LTD team collected and assessed information on key environmental, ecological, and social parameters present within the project areas. The approach for the environmental and socio-economic baseline study is as follows:

a) Environmental Baseline Study

- Desktop Review

The study source for desktop review included environmental project brief, geographical, ecological and socio-economic profiles for Mumbwa, data obtained from the CML, and other available maps, related reports and documents. The data collection and review had been conducted to:

- Collect documented data on all aspect of the project.
- Assess ongoing or planned initiatives related to Housing.
- Detailed review of any existing studies, environmental legislation, environmental and social quantitative and/or qualitative surveys and studies.
- Study the ZEMA environmental laws and regulations.
- Collect any additional data that is required to meet the requirements of the approving authorities.

- Data Collection and Site Surveys

Data collection and site surveys had been initiated prior to the development of Scoping Report and continued throughout the period of EIA study. It involved interacting with various stakeholder institutions and engaging with them through consultations at institution/residential/company level of Mumbwa and Lusaka. The prime objective of the activity is to carry out reconnaissance survey for site inspection and understanding project area for overall environmental and social assessment.

b) Socio-Economic Baseline Study

- Primary and Secondary Data

This assessment is based on primary exercises like field investigations, consultations/meetings with relevant stakeholders and secondary socio-economic data obtained from books, reports, journals, and other sources such as the Mumbwa State of the Environment Outlook Report, Central Statistics Office (CSO) Census Reports, NGOs, CBOs, Universities and other sources.

- Stakeholder Consultations and Focused Group Discussions

ESEC LTD ensured that each relevant stakeholder is involved during the study to provide a foundation for attaining and sustaining support of stakeholders, particularly the directly affected persons and local communities. Early engagement of stakeholders in any activity is critical, as community perceptions, expectations and relationships established can reduce risks and threats to the project.

The stakeholder engagement process included identification of stakeholders, in consultation with CML and ZEMA and analysis of their objectives and interest, engagement strategies and monitoring & reporting. The project stakeholders were engaged through consultation-based methodologies, comprising of qualitative and quantitative tools to acquire the project and project areas related information and suggestions/concerns from the stakeholders by using the questionnaires designed for this project. The website was prepared in such a way that it covered each component of the project requirement such as air, water, ecological, socio-economic, land acquisitions etc. Stakeholder meetings were conducted using the open designed website.

iii. Identification of Impacts and Mitigation Measures

Based on the findings of the field investigations and consultations, ESEC LTD team identified the potential impacts of all the project specific activities related to operation and decommissioning phase and the cumulative impact assessment (CIA) in detail using qualitative or quantitative methods. Interaction matrix has been used to identify the interaction between project activities and the environmental and social sensitivities. This records the rationale for the impacts and their

potential significance, mitigation measures, linked to relevant legislation and the provisions of the EMP.

Impacts are identified from environmental and socio-economic baseline as affecting the receptors air, water, land, biodiversity, resources, and community. These were further categorized into pre-construction, construction, operational and decommissioning impacts. Impact assessments were also based on criteria developed by ZEMA requirements.

iv. Analysis of Alternatives

ESEC LTD team on the basis and in coordination with CML and CML assessed all the alternatives options of the proposed project and provided the recommendations/suggestions for modification in the project works to eradicate and minimize the negative impacts. A comparative analysis of the alternative options in terms of technical, financial, environmental and social has been prepared with justification for the selection in the context of the local conditions. The 'Alternatives' has been analysed for the following components:

- Project Location
- Project Design
- Technology to be used
- No project scenario

v. Environmental and Social Management and Monitoring Plans

ESEC LTD developed the EMP consisting of the plans for the proper and improved implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. The proposed EMP comprises of mitigation and monitoring plan for Construction, Operation and Decommissioning Phases in accordance with the ToR.

ESEC LTD team also prepared the Monitoring and Evaluation (M&E) plan for the implementation arrangements and subsequently performance as well as outcome monitoring of the actions suggested in the EMP

8

ENVIRONMENTAL L MANAGEMENT AND MONITORING PLAN

8 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management and Monitoring Plan (EMMP) provides framework for management and mitigation of the environmental and social impacts associated with the Copper processing plant. The EMMP is a direct consequence of the EIA for the proposed project. It also depicts how the organizational capacity and resources will be organized to implement the mitigation measures proposed in the EIA.

CML will implement mitigation measures contained in the EMMP to ensure environmental protection. In this regard, the EMMP that is based on the Environmental Management Act No, 12 (2011), (EIA) Regulations of 1997 together with ZS specifications underscores responsibilities of the CML in safeguarding the environment in and around the proposed plant.

8.1 The Main Aim of the Environmental Management Plan

The aim of this Environmental Management plan for the plant is to avoid, minimize, or ameliorate effects or impacts resulting from plant activities and where possible, enhance beneficial effects. To this effect, CML is going to initiate several Environmental Action Plans in order to address the issues arising from this development.

Meanwhile the significant positive impacts from CML activities will be follows:

- Increased formal and informal Employment Opportunities for the locals especially the youths
- Increased market for miners supplying raw materials.
- Increased Government Revenue from Taxes
- Economic Multiplier Driver
- Increased Citizens' Participation in Economic Activities

The identified significant negative impacts from the implementation of the CML proposed plant are:

- Generation of noise by plant equipment
- Possible ground water contamination resulting from chemical, oils and hexane usage.
- Air pollution due to Emission from processing activities e.g. use of crushers and dust during operation activities especially at the ore feeding point

Due to the foregoing Environmental Management Plans to enhance the positive impacts, and mitigate the negative impacts have been developed and cover the following aspects:

1. Assigning responsibilities for the anticipated negative impacts for mitigation and costing
2. Identifying and assigning possible areas for amplifying the positive impacts
3. Continuing with local and institutional public consultations for mitigations that ensure Sustainable development

The developed EMMPs in section 8.2 are derived from the summarized mitigation for negative impacts in section 6.0, which outlines the mains sources of the risks discussed.

The impact mitigation plan allocates the responsibilities for implementation of the proposed mitigation measures to the various stakeholders and indicates at what stage in the project they should be performed. The Plan is presented in this chapter and it addresses the negative impacts generated by the project activities throughout the cycle and presents the associated cost estimates of mitigating the adverse impacts. The key components of the proposed impact mitigation plan are:

- Surface Water Management
- Erosion Control and Sediment Retention

- Water Quantity and Quality
- Vegetation and Flora
- Wildlife and Fauna Habitats
- Processing chemicals Management
- Hazardous Waste Management
- Noise
- Occupational Health and safety
- Land and Soil
- Air Quality
- Noise
- Landscape and Aesthetics
- Land-use and Surrounding Environment
- Socio-economic issues
- HIV/AIDS Awareness
- Work Accidents

8.2 Surface Water Management

Surface water is an important component of both ecological and human use of the land. The aim of the surface water management Program is to ensure that where practical, flows into and through the project site and the nearby streams are maintained and that water quality to these systems is maintained.

8.3 Erosion Control and Sediment Retention

The nature of the soils at the project area indicates that they are prone to erosion in a disturbed state. According, and where appropriate, all surface runoff from areas of disturbance and areas with elevated runoff coefficient will be directed by correctly designed drainage system, to sediment traps with sufficient volume and retention time to maximize settlement of suspended sediment prior to release. The drains will be designed according to the characteristics of peak flows for the predetermined design storm, and the requirement to discharge flows without causing erosion.

8.4 Effluent Discharge and Treatment

There shall be effluent produced from the plant process. The effluent will be discharged into the proposed effluent treatment plant. All monitoring of the effluent will be at the treatment plant. The other effluent will be sewer materials and other domestic/official uses which will be collected in a septic tank/Soak-away.

The groundwater system will be protected by constructing soak-away system that will not contaminate the ground water system. Thus a septic tank with a water tight lining connected to a soak-away will be constructed to allow for collection of slug that will eventually be emptied once full with the liquid matter that will float out into a soak-away system which will be sighted 60 metres away from water bodies water abstraction point in line with the requirements of the Public Health Act. It is anticipated that generally after 60 metres water would have purified in the underground formation of a combination of the geological and soil material which works as filter.

8.5 Optimum Usage Processing Chemicals

Excessive usage and spillage of processing chemicals can not only result in higher operating cost but also elevated level in surface and underground water systems.

8.6 Biomass Burning

There will be no biomass burning generated during weeding and landscape maintenance will be composited.

8.7 Noise

Noise generated from construction and operations at the project site is not expected to impact on local communities due to the distances between the operations area and areas of habitation. However, the development's technical team will investigate any noise complaints received.

8.8 Soil Erosion

Gullies can easily form due to water erosion. This is an ecological disadvantage for there will be gully erosion. The hazard assessment results should be used to plan the proposed plant and associated structures properly and put up a well paved drainage system.

8.9 Sediment Ponds

Drainage system for effective conveyance of surface runoff away from disturbed areas will minimize the extent of erosion. For plant, roadside drains may play this function and will further retain direct discharge of eroded soil particles.

8.10 Sewerage effluent Sanitation Facilities

Improper sanitation facilities may lead to disease outbreak (airborne, waterborne or vector borne). Adequate sanitation facilities include:

- Toilet facilities adequate for the plant and additional workforce with septic tanks that will be maintained regularly to ensure their effectiveness.

8.11 Occupational Safety and Health

The safety and environmental control unit will be formed and 'beefed up' in order to minimize work place accidents. The following will be done:

- Workers shall be given proper and adequate training in machinery handling and safe working procedures.
- Personnel protective apparels such as safety boots, gloves, and respirators (especially for possible pesticide application) shall be provided in terms of suitability and adequacy.

Traffic signage at strategic locations within the access roads shall be provided, particularly farm blocks undergoing harvesting where haulage traffic volume is higher than any other block.

8.12 Management of Hazardous Materials

The following measures will be implemented to minimize potential environmental pollution

arising from these materials:

- i. **Processing chemicals** – proper storage and handling used containers will be returned to suppliers or collected for proper disposal – the developer will ensure they are never reused for domestic purposes;
- ii. **Used lubricants** – will be collected for disposed of as wastes in accordance with ZEMA Regulations;
- iii. **Fuel dispensing** will be carried out at points within the estate and by trained and experienced personnel to prevent spillage;
- iv. **Containers for fuel** and fuel enhancers will be collected and properly disposed of in accordance with ZEMA Regulations.

8.13 Community Consultation and Interaction

CML shall adhere to its corporate policy of working with the local authorities and the surrounding communities to ensure that the expansion project becomes very much a part of the local community by adhering to lease agreements and other deliberations. The corporate affairs office shall constantly liaise with the community to thwart land tensions wherever necessary.

8.14 Workforce Awareness

Work force awareness and culture is an important component in minimizing environmental and cultural impacts resulting from project operations. Plant personnel will be made aware of the MML Environmental Policy. An environmental awareness induction plan will be implemented to ensure that all plant workers are aware of their environmental responsibilities.

8.15 HIV/AIDS Awareness Program

CML HIV/AIDS Workplace Policy should be implemented throughout the organization structure. The Safety, Health and Safety Department which is given the mandate to implement the policy should ensure that all employees and other casual workers are sensitized about the dangers of HIV/AIDS.

Copper Processing Plant - Mumbwa

Table 8-0.1: CML ENVIRONMENTAL MANAGEMENT PLAN

ASPECT	IMPACT	OBJECTIVE	MITIGATION/ENHANCEMENT MEASURE	FREQUENCY OF MONITORING	TIME FRAME	PERFORMANCE INDICATOR	RESPONSIBLE PERSON	COST (US\$)
Site training	Positive Enhance people's skills	To sensitize all employees working at the plant site	<i>Site training session on Environmental management/safety</i>	Planning for periodical assessment.	During all stages of operation	Programme for education both employees and customers	CML Safety Manager	1500/Yr
Erosion at site	Negative soil degradation	Avoid soil degradation	Rehabilitate exposed areas to minimize erosion. Ensure proper usage of loose soils.	Planning for Periodical assessment	During all stages of operation	Absence of gullies and erosional signs	CML Safety Manager	330/month
Air Quality	Negative air pollution	To eliminate and reduce discomfort to workers and surrounding communities To control the movement of the heavy duty equipment	<i>Watering the ground to suppress any minute dust rising.</i> <i>Maintain dust levels $\leq 10\text{mg}/\text{m}^3$;</i> <i>Provide protective dust masks to workers.</i> <i>Control gaseous emissions from the plant unit operations; Nox, Sox,etc</i>	Regular inspections throughout the operation Phase.	During all stages of operation	Exhaust fume, emissions, unpleasant odour, dust are controlled.	CML Safety Manager	200/month
Solid waste management	Negative land pollution	To avoid unwarranted disposal of solid waste.	<ul style="list-style-type: none"> • <i>Disposal of waste will be limited to approved solid waste disposal sites</i> • <i>Waste management protocols</i> • <i>Waste management protocols including designated storage areas for solid waste with segregation for recyclable materials</i> 	Regular inspections throughout the operation Phase	During all stages of operation	Absence of solid waste.	CML Safety Manager	500/month

Copper Processing Plant - Mumbwa

Noise Pollution due to operation activities	Negative Noise Pollution	To minimize noise disturbance to resulting from the operations of the Plant	<i>Noise levels will be monitored, if results are above the recommended 80db appropriate mitigation measures like provision of ear protective gears and appropriate clothing to the workers operating at the site; Use of well- maintained machinery.</i>	Regular inspections throughout the operation Phase	During all stages of operation	Noise levels at the nearest sensitive receiver are minimized.	CML Manager	Safety	200/month
Safety/Health risk of workers	Negative	To prevent accidents, injury or health risks to workers/public	<i>Periodic training and continual safety reminders to all operating staff and require periodic drills in safety and emergency procedures;</i> <i>Ensure that all workers are briefed on potential hazards and necessary safety precautions;</i> <i>Implementation of emergency procedure on site;</i> <i>Use of clearly labeled signage during and after the project operational phase;</i> <i>Proper labeling of machinery and equipment with the necessary pictorial and written instructions;</i> <i>Ensuring that the employees wear protective clothing at all times during all the phases of plant activities</i>	Periodical inspections throughout the operation Phase.	Throughout the plant cycle	Operational Manual on Safety, Health and Environment for construction workers is developed and available on site.	CML Manager	Safety	6000/yr
Oil and fuel leaks	Negative	To prevent contamination of soils and underground aquifers	<i>Oil shall be cleaned immediately any spill is noticed</i> <i>Vehicles shall be serviced in designated garage with concretized surface;</i> <i>All oils shall be properly kept in secure concretized room at the motor vehicle workshop to avoid direct spillages to underground water.</i>	Planning for Periodical assessment	Throughout the plant cycle	Absence of oil leaks	CML Manager	Safety	500/month
Public Health and safety	Negative	To prevent public injury or health risks to workers/public	<i>Sufficient warning sign posters shall be installed in all areas under maintenance and out of use. The speed limit signs and /or humps for vehicles coming into the plant to be provided. Speed humps to help reduce the speed of trucks on the access roads will be built.</i>	Planning for Periodical assessment	Throughout the plant cycle	Evidence of a health workforce and records.	CML Manager	Safety	500/month

Copper Processing Plant - Mumbwa

Occupational Safety and Health Risk of Workers	Negative	To prevent accidents, injury or health risks to workers/public	<ul style="list-style-type: none"> • <i>Implementation safety and health policies designed to identify, evaluate, monitor and control health hazards and provide safety training;</i> • <i>There shall be a health scheme for the employees;</i> • <i>Employees shall be regularly trained and drilled to firefighting and safety techniques;</i> • <i>The firm shall ensure that all visitors are briefed on potential hazards and necessary safety precautions;</i> • <i>Implementation of emergency procedure on site;</i> • <i>Use of clearly labelled signage;</i> • <i>Proper labelling of machinery and equipment with the necessary pictorial and written instructions;</i> • <i>Ensuring that employees wear protective clothing at all times;</i> • <i>Proper control and directing of traffic during peak period for deliveries.</i> 	Planning for Periodical assessment	Throughout the plant cycle	Operational Manual on Safety, Health and Environment for construction workers is developed and available on site.	CML Manager	Safety	1000/month
Flora & Fauna due Site clearance.	Negative Loss of Flora & Fauna diversity	To minimize disturbance	<ul style="list-style-type: none"> • <i>good plant practices and replanting of exotic plants within the plant</i> • <i>Leave undisturbed areas to allow for natural vegetation to flourish for maintenance of fauna biodiversity</i> • <i>Implement a Landscaping plan for establishment of green fields</i> 	Planning for Periodical assessment	Throughout the plant cycle	Presence of undisturbed areas within and around worksite Presence of green fields	CML Safety Manager		1000/month
Water quality	Surface and ground Water Quality	To prevent surface and groundwater pollution	<ul style="list-style-type: none"> • <i>Proper design of drainage system for storm water control</i> • <i>Monitoring and maintenance of sewerage system</i> • <i>Monitoring effluent for quality and quantity, especially suspended solids, settled solids, BOD, COD etc</i> 	Planning for Periodical assessment	throughout the plant life	Effluent within allowable limits Compliant quarterly Audit and Monitoring returns Well serviced monitoring equipment	CML Safety Manager		4000/month
TOTAL									15,730.00

Copper Processing Plant - Mumbwa

Table 8-0.2: CML EMMP

Impact	Mitigation Measure	Objective	Actions to be taken for its implementation	Period of Implementation	Indicators	Authority Responsible	Cost of Mitigation
Impact on Land and Soil							
Soil contamination due to improper storage of chemicals, fuels and poor waste oil disposal methods.	Chemicals and Petroleum products dispensing shall be done by qualified personnel;	To regulate any chemical usage.	Regularly weekly reports on soil composition at selected sites.	From inception to operation phase	Any visible soil contamination	<input type="checkbox"/> Developer <input type="checkbox"/> Site Engineer	Training
Exposed soil is prone to erosion by water or wind.	Limitation of earth moving to dry periods;	To avoid erosion of soil by fast flowing rainwater.	Period of construction shall be specified.	All Phases	Visible signs of soil erosion	<input type="checkbox"/> CML	1,000USD
	Protection of susceptible soil surface with cover crops and grass;	To control the current of the fast flowing rainwater.	Mitigation measures provided for impacts on soil shall be part of the overall Implementation Cost.	All Phases	Visible signs of soil erosion	<input type="checkbox"/> CML	1,500USD
	Protection of drainage channels by planting grass or stone pitching;	To avoid direct contact of fast flowing surface water with susceptible soils.	Stone pitching and grass planting in drainage systems shall be part of the overall Implementation Cost as means of mitigating soil erosion.	All Phases	Visible signs of soil erosion	<input type="checkbox"/> CML	1,000 USD for stone pitching
Exposed soil is prone to erosion by water or wind.	Installation of Sedimentation basins or planting of erodible surfaces as soon as possible.	To trap soil particles from the current of the fast flowing water.	Mitigation measures for impacts on soils shall be part of the overall Contractor conditions.	All Phases	Visible signs of erosion	<input type="checkbox"/> CML	4,000 USD
Soil compaction could result following Plant activities.	Permanent access routes to be used.	To limit the size of area prone to compaction.	Mitigation measures for impacts on soils compaction shall be part of the overall Implementation Cost.	All Phases	Soil Compaction	<input type="checkbox"/> CML	Covered in the construction
Soil erosion near drainage channels where water velocity could increase.	Soil erosion should be prevented especially near drainage channels	To control soil erosion and check for drainage channels requiring attention.	Program for regular Plant drainage maintenance shall be developed and made available.	All Phases	Presence of Gullies	Local authorities	5,000 USD

Copper Processing Plant - Mumbwa

	Regular maintenance of drainage channels for COD, BOD, etc.	To prevent deterioration water bodies, which are prone to soil erosion.	Mitigation measures for impacts on soil erosion shall be part of the overall Implementation Cost.	Operation Phase	Presence of Gullies	<input type="checkbox"/> CML <input type="checkbox"/> Local authorities	
Impacts on Vegetation							
Retardation of vegetation growth due to contamination from dust particles and gas emissions.	Dust control by application of water; Gravel road will be maintained.	To suppress dust generation	Mitigation Measures for impacts on vegetation shall be part of the overall Implementation Cost.	All Phases	Vegetation Quality	<input type="checkbox"/> CML	1,000 USD
	Spraying water using water bowsers	To reduce the amount of dust generation.	Mitigation measures for impacts on vegetation shall be part of the overall Implementation Cost.	Operation Phase	Vegetation Quality	<input type="checkbox"/> CML	
Loss of vegetation due to site clearing which will lead to loss of habitat and displacement of fauna species, especially avifauna.	Planting of trees in the plant;	To avoid mechanical clearing and reduce the extent of the area without vegetation.	Mitigation measures for impacts on vegetation shall be part of the overall Implementation Cost	All Phases	Vegetated Area	<input type="checkbox"/> CML	400 USD
Impact on water quality							
Siltation of water courses due to soil erosion of nearby drains and heavy rains.	<input type="checkbox"/> Buffer zones of undisturbed areas <input type="checkbox"/> Sediment traps in drainages gullies	To filter of the sediment particles in the fast flowing rain water with undisturbed trees and grass.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Implementation Cost	Operation Phase	<input type="checkbox"/> Turbidity <input type="checkbox"/> Sediment load	<input type="checkbox"/> CML	Covered under mitigation for Soil Erosion
Siltation of water courses due to soil erosion of nearby drains and culverts.	Drainage systems shall have scour checks;	To reduce the current of rainwater flow.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Implementation Cost	Operation Phase	<input type="checkbox"/> Turbidity <input type="checkbox"/> Sediment load	<input type="checkbox"/> CML	6,000 USD

Copper Processing Plant - Mumbwa

	Drainage systems shall discharge into settlement basins; later re-used in the Plant	To create a water reservoir which can be used by Plant and milling	Mitigation measures provided for impacts on Water Quality shall be part of the overall Implementation Cost	Operation Phase	<input type="checkbox"/> Turbidity <input type="checkbox"/> Sediment load	<input type="checkbox"/> CML	Covered above in the drainage system cost
	Silt traps shall be put along drainage systems;	To protect surface water pollution through filtering finest particles in water current.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Implementation Cost	Operation Phase	<input type="checkbox"/> Turbidity <input type="checkbox"/> Sediment load	<input type="checkbox"/> CML	
	Spoon drains shall have scour checks. Monthly sampling and preparation of report for local authority and ZEMA	To control excessive flow and risks of erosion.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Implementation Cost	Operation Phase	<input type="checkbox"/> Turbidity <input type="checkbox"/> Sediment load	<input type="checkbox"/> CML	
Water shortage for the local community due to over exploitation for plant operation. This where the use boreholes will be handy	Exploitation of water sources for approval by the local authority and with consent from the local community.	To avoid conflicts and to receive support from the local community.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Implementation Cost	Operation Phase	Extent of Water Scarcity in the community	<input type="checkbox"/> CML	2,000 USD
Ground water contamination due to construction of substandard campsite pit latrines for workers.	Provision of proper functioning toilet facilities.	To filter pollutants from getting to the ground water.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Implementation Cost	Operation Phase	<input type="checkbox"/> Fecal count <input type="checkbox"/> Ecoli <input type="checkbox"/> Presence of Odor	<input type="checkbox"/> CML	700 USD
	Good hygienic standards and proper maintenance of pit latrines.	To promote cleanliness and avoid epidemics in construction camps.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Construction Phase	<input type="checkbox"/> Fecal count <input type="checkbox"/> Ecoli <input type="checkbox"/> Presence of Odor	<input type="checkbox"/> CML	700 USD

Copper Processing Plant - Mumbwa

Sedimentation and increased turbidity in nearby surface water caused by erosion of bare areas and runoffs resulting from site grading works and drainage.	Steep area shall be avoided;	To make use of available soils and reduce on creating more bare areas which are prone to soil erosion.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Operation Phase	<input type="checkbox"/> Signs of Erosion <input type="checkbox"/> Turbidity <input type="checkbox"/> Sediment load	<input type="checkbox"/> CML	700 USD
	Sides of drainage channels shall be planted with grass or stone pitched;	To filter of the sediment particles in the fast flowing rain water with grass and also to avoid erosion of soil surfaces by stone pitching.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	Operation Phase	<input type="checkbox"/> Signs of Erosion <input type="checkbox"/> Turbidity Sediment load	<input type="checkbox"/> CML	
	Drainage systems shall have scour checks esp. from milling plant.	To reduce the current of rainwater flow.	Mitigation measures provided for impacts on Water Quality shall be part of the overall Tender Document	<input type="checkbox"/> Operational Phase	<input type="checkbox"/> Signs of erosion <input type="checkbox"/> Turbidity <input type="checkbox"/> Sediment load	<input type="checkbox"/> CML	As above
Impacts on Air Quality							
Air pollution caused by Gaseous emissions, exhaust fumes and dust from trucks, graders will affect human, vegetation and also disturb habitats for birds and insects.	<input type="checkbox"/> Regular sampling of boiler stack gas from chimneys <input type="checkbox"/> Erecting tall chimney <input type="checkbox"/> maintenance of operation vehicles and equipment in order to reduce emission of exhaust fumes; and installation of water Scrubbers	<input type="checkbox"/> To ensure gaseous emissions are devoid of pollutant gasses above speck. <input type="checkbox"/> To check for defects and servicing of the vehicles and equipment so that they are in good operation condition.	<input type="checkbox"/> Site engineer shall keep up to date records on gaseous emissions as a result of the development. <input type="checkbox"/> Log book on vehicle & equipment maintenance shall be kept on the plant for inspection and shall be part of the overall Tender Document	<input type="checkbox"/> Operation phase	PM ₁₀ , NO ₂ , CO ₂ , SO ₂ , CO, VOCs	<input type="checkbox"/> CML	30,000USD / month for medium to old
	Periodically water down on Plant in-route roads;	To suppress dust.	Log book on dust control showing watering times shall be kept on site for inspection and shall be part of the overall Tender Document	Operation Phase	PM ₁₀ , NO ₂ , CO ₂ , SO ₂ , CO, VOCs	<input type="checkbox"/> CML	N/A

Copper Processing Plant - Mumbwa

Unpleasant odours due to poorly maintained toilets and poor waste management.	Cleaning and regular maintenance of toilets to avoid unpleasant odours.	To maintain and promote a healthy environment at campsites and prevent the spread of diseases.	Public Health standards as provided under the Public Health Act Cap 295 shall be enforced shall be part of the overall Implementation Cost	Operation Phase	Odour	<input type="checkbox"/> Contractor <input type="checkbox"/> CML <input type="checkbox"/> Local Authority	On-going (Administrative)
Impacts of Noise							
Noise and vibration caused by Plant trucks, construction machinery and other operations.	Working hours limited to day light only;	To avoid sleep disturbance at night.	Enforcement of EM (L) R, 2013 on Noise Abatement.	Operation Phase	Excessive noise levels, complaints from residents	<input type="checkbox"/> Contractor <input type="checkbox"/> Developer <input type="checkbox"/> ZEMA <input type="checkbox"/> Local Authority	Cost is not applicable as the Programme is based on 9day working hours.
Noise and vibration caused by Plant trucks, construction machinery, and other operations.	Enforcement of the Factories Act, Cap 441.	To promote occupational health and safe working conditions among the construction workers.	Enforcement of the Factories Act, Cap 441.	Operation Phase	Excessive noise levels, complaints from residents	<input type="checkbox"/> Contractor <input type="checkbox"/> Developer <input type="checkbox"/> Ministry of Labour	3,000 USD
Noise from increased traffic.	Apply all ZEMA Regulation on Noise Abatement;	To monitor and control noise generation.	Enforcement of EM (L) R, 2013 on Noise Abatement.	Operational Phase	Excessive noise levels, complaints from residents	<input type="checkbox"/> ZEMA <input type="checkbox"/> Local Authority <input type="checkbox"/> Local Police <input type="checkbox"/> Traffic Unit	
	Control of noise generating activities (by local by-laws).	To monitor and control noise generation.	Enforcement of EPPC Act, Cap 204 on Noise Abatement.	Operational Phase	Excessive noise levels, complaints from residents	<input type="checkbox"/> ZEMA <input type="checkbox"/> Local Authority <input type="checkbox"/> Local Police <input type="checkbox"/> Traffic Unit	
Impacts on Landscape and Aesthetics							

Copper Processing Plant - Mumbwa

Visual impact of the Plant works could be substantial if designs are not compatible with the surrounding environment	Development of plant and other facilities must be environmentally safe enough and compatible with the surrounding environment.	To maintain areas of scenic beauty.	Plant design shall be Environmentally safe enough and compatible with the surrounding environment.	<input type="checkbox"/> Design Phase <input type="checkbox"/> Construction Phase	Visual analysis	<input type="checkbox"/> Design Engineers <input type="checkbox"/> Developer	Covered in landscaping cost
Disfigurement of the natural landscape and aesthetic view due to piles of biomass, fresh fruit bunches etc.	The solid waste and other products of the Plant shall be either re-used or burnt safely using a certified incinerator.	To maintain areas of scenic beauty	Plant designs shall be environmentally and compatible with the natural landscape of the surrounding environment.	<input type="checkbox"/> Design Phase <input type="checkbox"/> Construction Phase	Visual View	<input type="checkbox"/> Design Engineers <input type="checkbox"/> Developer	Covered under landscaping
Impacts on Land-use and surrounding environment							
If unskilled people are not recruited from local areas then it is likely that people who reside far away from the project area may get employed and decides to settle near the project.	<input type="checkbox"/> Local people with the necessary skills shall be employed in the Plant project <input type="checkbox"/> Training shall be offered;	To avoid Un-planned settlements which may lead to land use change and social upheavals.	Recruitment of local people for unskilled labour shall be the priority and as part of the overall Implementation Cost.	<input type="checkbox"/> Design Phase <input type="checkbox"/> Construction Phase	<input type="checkbox"/> Unplanned Settlements <input type="checkbox"/> Social Order	<input type="checkbox"/> Developer <input type="checkbox"/> Community Representative <input type="checkbox"/> Local Authority	Mitigated through salaries
Emission of exhaust fumes to the surrounding environment due to increased traffic.	ZEMA Regulation on Air Pollution;	To monitor and control emission of exhaust fumes to the surrounding environment.	Enforcement of EM (L) R, 2013 on air Pollution	Operational Phase	PM10, NO2, CO2, SO2, CO, VOCs	<input type="checkbox"/> ZEMA <input type="checkbox"/> Local Authority <input type="checkbox"/> ZEMA Monitoring Unit	
	Adherence to engine maintenance schedules and standards to reduce air pollution.	<input type="checkbox"/> To keep the Plant viable environmentally <input type="checkbox"/> To check for defects and repair any malfunctioning engine.	<input type="checkbox"/> Enforcement of EM (L) R, 2013 on Air Pollution. <input type="checkbox"/> Development of engine maintenance schedules and making them available for inspection on site.	<input type="checkbox"/> Operational phase	PM10, NO2, CO2, SO2, CO, VOCs	<input type="checkbox"/> Developer <input type="checkbox"/> Contractor <input type="checkbox"/> ZEMA	15,000 USD

Copper Processing Plant - Mumbwa

Impacts on Socio-economic Environment							
Temporary marriages, casual sex relationships and more chances of transmission of sexual diseases due to interaction of project workers with local communities.	There shall be provision of education both to the local community and camp workers on STDs and HIV/AIDS using aids such as video shows, pamphlets, talks, etc.	To sensitize the construction workers and local communities about the dangers of STDs and HIV/AIDS and to protect themselves.	Mitigation measures for impacts of STDs and HIV/AIDS shall be part of the overall implementation Cost.	Construction Phase Operational Phase	<input type="checkbox"/> Divorce cases <input type="checkbox"/> STI/STD disease prevalence rates	<input type="checkbox"/> Developer <input type="checkbox"/> Community Based Organizations <input type="checkbox"/> Local Authority	On-going Cost
Increased vehicular traffic and accidents in black spot areas.	Provision of adequate warning road signs in black spot areas and speed retarders and/or mechanisms at village crossing sites.	To prevent fatal accidents especially that the increase in the vehicular traffic will be huge.	Mitigation Measures for impacts on socioeconomic shall be part of the overall Implementation Cost.	Operational Phase	Availability of warning signs	• Developer • Local Authority	400 USD
Impacts of Increased Road Traffic							
Excessive dust from vehicles could affect the natural environment.	Through watering of dust roads.	To avoid respiratory and visibility problems and the gathering of dust on protected areas and property.	Mitigation Measures for impacts of traffic shall be part of the overall Implementation Cost.	Operation Phase	PM10	<input type="checkbox"/> Contractor <input type="checkbox"/> Local Authority	Water bowser US\$50/hr
Impacts of Work Accidents							
Advanced planning of safety equipment requirements	Development of safety procedures and operational manual.	To ensure that Workers undertaking Plant tasks know exactly what is to be done.	Mitigation Measures for impacts of work accidents shall be in Tender Document.	Operational Phase	Availability of safety Tool kits	<input type="checkbox"/> Contractor <input type="checkbox"/> Local Authority	2000 USD Yearly

Copper Processing Plant - Mumbwa

Lack of enforcement of safety and health regulations could impact negatively on Plant workers.	Enforcement of Public health and safety regulations.	To safe guard the health and safety of workers.	Mitigation Measures for this impact shall be in the Tender Document.	Operational Phase	Potential site hazards	<input type="checkbox"/> Developer <input type="checkbox"/> Contractor <input type="checkbox"/> Local Authority	On-going Cost
Socio-economic impact of the project on surrounding areas							
Interaction of construction and Plant workers with the nearby communities may lead to transmission of sexually transmitted diseases.	There shall be provision of education both to the local community and workers on STDs and HIV/AIDS using aids such as video shows, pamphlets, talks, etc.	To prevent the transmission of sexually transmitted diseases between the local community and Construction workers.	Mitigation Measures for impacts of construction camps shall be part of the overall Implementation Cost.	Operational Phase	STI/STD Disease Prevalence Rates	<input type="checkbox"/> Contractor <input type="checkbox"/> Developer <input type="checkbox"/> Local Authority <input type="checkbox"/> CBO on Health	On-going Awareness Program with staff and communities
	Local people with the necessary skills shall be employed	To ensure the local community benefit from the project.	Mitigation Measures for impacts of construction shall be part of the overall Implementation Cost.	Operational Phase	STI/STD Disease Prevalence Rates	<input type="checkbox"/> Developer <input type="checkbox"/> Local Authority <input type="checkbox"/> Labour Department of Ministry of Labour <input type="checkbox"/> Community representative	2,500 USD
TOTAL							77,200.00

9

ENVIRONMENTAL MONITORING PLAN

9. ENVIRONMENTAL MONITORING PLAN

Environmental monitoring ensures that the impacts have been accurately predicted and that appropriate mitigation measures are being implemented as planned and that they have the expected effects. Identification of potential environmental impacts associated with the construction of the Copper Processing Plant indicates a need to design and implement a specific environmental monitoring plan. The monitoring process begins with supervision of implementation. The bulk of the activities may take place during the implementation stage.

The environmental objectives of these activities are to ensure mitigation measures outlined in the contracts are being properly implemented, that environmental contractual measures are being respected, construction is going in accordance with the agreed design standards and that no unforeseen negative impacts are occurring as a result of project execution. The key components of the proposed environmental monitoring plan are presented under table of Monitoring Activities and Indicators. While it is appropriate to indicate that progressive construction will be practiced, this aspect of Environmental Management is not always possible as some areas only become available at the end of the project construction phase. As the construction phase progress, the monitoring plan will be reviewed and adjusted in accordance with project environmental management requirements outlined in this report.

9.1 Monitoring arrangements

To avoid deliberate creation of gaps between what actually gets implemented on the ground, the contracts must spell out the sanctions for noncompliance with mitigation measures.

ESEC LTD is to compile an activity Environmental report that will form the basis for assessment of environmental performance.

9.2 Operational Phase

CML will be responsible for monitoring and management of all indirect impacts occurring in the project area.

Copper Processing Plant - Mumbwa

Table 9-2.0.1: Monitoring and reporting

Impact	Mitigation measure	Monitoring and reporting method	Frequency	Responsibility
Erosion	Design and construction of drainage reticulation will arrest the flow of water.	Design plans and site diary	-	Engineering/Safety Manager
Erosion	Careful design of paving	Design plans	On going	Safety manager and contractors
Soil contamination	Fuel and oil containers will be stored in a bunded area. Any decanting will also take place in that area.	Site inspection	Daily	Safety/ managers
Soil contamination	Building rubble and spoil, will be collected and reused or taken to a dumpsite	Site inspections	Daily	Safety/Maintenance managers
Air pollution	A water bowser will regularly water the areas on the plant not concreted to suppress the dust	Site diary	Daily	Safety manager
Air pollution	All motorized traffic will be regularly serviced to curtail above normal fumes. Boiler emissions to be controlled	Plant and Vehicle service monitoring records	On going	Safety and Production Managers/Logistic officer
Noise pollution	Areas involving noisy machinery or activities will be fit with noise reducers and serviced for good noise performance. Equipment and plant machinery shall be well maintained and in good condition such that noise emitted is within an acceptable level	Complaints records	On going	Safety and Production Managers
Health and Safety	Traffic will be controlled to ensure public and workers' safety.	Site inspection	-	Safety manager/ Security
Health and Safety	Health and Safety standards will be maintained at all times on site.	PPE issue records Accident records	On going	Safety manager
Health and Safety	Appropriately designed entry points and signs.	Site design	-	Safety manager
Health and Safety	Personnel will be issued with and have a contractual obligation to wear appropriate Personal Protective Clothing, when required.	PPE issue records Accident records	On going	Safety manager
Health and Safety	Promotion of health awareness, particularly HIV/AIDs prevention.	Training records, publications	On going	Safety manager
Traffic	Design and construction of ingress and egress points with broader width.	Site design	-	Developer
Visual impact	The design layout of the CML aims to minimise any negative visual impact in the area.	Site design	-	Developer

Copper Processing Plant - Mumbwa

Visual impact	Selection of materials and external colour schemes will be professionally chosen.	Site design	-	Developer
Water abstraction	Water will be abstracted into holding tanks from the borehole.	Reports and water testing records	Ongoing	Safety manager
Solid waste management	A private firm will be engaged to collect domestic waste on a regular basis.	Invoices	Ongoing	Disposal contractor
Solid waste management	CML will supply bins to areas will be designated for rubbish separation and collection.	Site Inspections	Ongoing	Safety manager
Soil Contamination	All storage facilities for fuels to be banded and concretized.	Site Inspections	-	Safety manager
Soil Contamination	Waste disposed of in designated areas	Site inspections	Daily	Safety manager
Health and Safety	Domestic waste collected and disposed of regularly	Site Inspections, Invoices	monthly	Safety manager
Health and Safety	Contractual obligation to wear PPE encouraged	Accident records, PPE issue records	Ongoing	Safety manager
Health and Safety	Fire hydrants and hoses located in high risk areas	Fire equipment inspection records	Quarterly	Safety manager
Health and Safety	Fire hydrant placement in premises and appropriate training	Training records equipment inspection records	Quarterly	Safety manager
Health and Safety	All workers required to follow Good Practices	Audit records	Annually	Management
Security	Engaging a reputable security firm.	Security reports	-	Security firm
Noise	Restriction on noisy activities on the site	Site inspections	-	Management

Copper Processing Plant - Mumbwa

Table 9-2.0.2: Monitoring and reporting

IFC EHS Guideline	Host Country Regulatory Limit	Element to be Monitored	Method of Monitoring	Frequency of Monitoring	Indicator	Means of Verification	Authority Responsible	Cost	Sampling area/ source
Land and Soil									
		Land and Soil	Site Engineer to make inspections of sites for storage of materials, oil and fuels and ensure they have sealed surfaces.	Periodical inspections throughout the Construction Phase	Clean storage sites free from any oil or fuel spillage maintained throughout Construction Phase.	Inspection Report is available at MML	CML Engineering Department	US\$ 200	Entire plant
			Site Engineer to inspect the waste disposal sites.	Periodical inspections throughout the Construction Phase	Waste oil is being disposed of in designated sites and in the approved method.	Inspection Report is available at MML Engineering Department	CML	N/A	
			Site Engineer to ensure used oil is being collected for recycling.	Periodical inspections throughout the Construction Phase	Containers for collection of used oil are available on site.	Used oil from serviced plant machinery has been collected in containers.	CML	US\$ 600	
			Site Engineer to inspect storage tanks and ensure they have bound walls around them high enough to contain any spillage.	Once before the fuel storage tanks are put to use.	Bund wall design and construction plan has been developed approved and is available.	Bund walls around fuel storage tanks have been constructed.	CML	N/A	
			The Site	Daily inspections	Absence of caterpillar trampling on	Complaints from the local community on	CML	N/A	

Copper Processing Plant - Mumbwa

			Engineer to make inspections and ensure heavy construction equipment is confined	throughout the Construction Phase.	plant area	invasion of their lands by construction equipment are nonexistent.			
			The Site Engineer to undertake inspection of earthworks and ensure that slopes are graded to specifications.	Daily inspections throughout ALL Phase.	Absence of rills, gullies	Absence of erosion features.	CML	N/A	
			Once earthworks are completed, the Site Engineer should monitor the restoration measures to be implemented such as re-vegetation	Each time earthworks are completed throughout Construction Phase	Presence of re-vegetation in erosion prone areas.	Restoration programmed for re-vegetation of exposed soils is available and is being implemented.	CML	Ongoing Cost through employed Site Engineer	
Vegetation									
		Vegetation	Site Engineer to ensure that excessive	Each time clearance of vegetation is	The area of vegetation cleared is	Area for vegetation clearance is	CML	Ongoing Cost through employed Site	Office area and open

Copper Processing Plant - Mumbwa

			clearance of vegetation is avoided and should be confined to the	being done throughout Construction Phase	minimal	clearly marked and is confined to the designs.		Engineer	areas
Water Quality (Effluent Discharge from the plant)									
		Water Quality	Site Engineer to inspect and satisfy that interceptors are put in place and working well.	Periodical inspections throughout the Construction Phase.	Clean water supply maintained throughout the Construction Phase.	Absence of water pollution incidents	CML	Ongoing Cost through employed Site Engineer	Waste water treatment plant,
-30 mg/l	-5.5-9	-pH	Site Engineer to inspect and satisfy that areas where hazardous liquids are stored are banded.	Periodical inspections throughout the Construction Phase.	Clean water supply maintained throughout the Construction Phase.	Absence of water pollution incidents	CML	Ongoing Cost through employed Site Engineer	
-125 mg/l	-50 mg/l -150 mg/l	-Biological Oxygen Demand							
-50 mg/l	-100 mg/l	-Chemical Oxygen Demand							
-400b MPN/100ml	-5000 MPN/100 ml	-Total Suspended Solid	Site Engineer to inspect and satisfy that water from concrete batching plants is treated.	Periodical inspections throughout the Construction Phase.	Clean water supply maintained throughout the Construction Phase.	Absence of water pollution incidents	CML	Ongoing Cost through employed Site Engineer	
n/a	-150	-Coliform							
n/a	-2 mg/l	-Free Chlorine content (Cl ₂)							
		-Total nitrogen content							

Copper Processing Plant - Mumbwa

-10 mg/l	-40 mg/l								
			Site Engineer to inspect and satisfy that silt traps are put along drainage systems;	Periodical inspections throughout the Construction Phase.	Clean water supply maintained throughout the Construction Phase.	Absence of water pollution incidents	CML	Ongoing Cost through employed Site Engineer	
			Site Engineer to inspect and satisfy that spoon drains have scour checks.	Periodical inspections throughout the Construction Phase.	Clean water supply maintained throughout the Construction Phase.	Absence of water pollution incidents	CML	Ongoing Cost through employed Site Engineer	
			Site Engineer to inspect and satisfy that siting of pit latrines is done away from water logged areas;	Before construction of pit latrines.	Construction is done according to design specifications.	Pit latrine siting and construction report	CML	Ongoing Cost through employed Site Engineer	
		Air Quality							
1 Year			Site Engineer to observe the level of dust generated during operation. Watering	Regular inspections throughout the Construction Phase.	Deposition of dust on surfaces such as grasses, shrubs, trees and rooftops should	Dust deposition on the immediate surroundings is controlled.	CML	Ongoing Cost through employed Site Engineer	

Copper Processing Plant - Mumbwa

- 20 mg/m3 24 hour – 50 mg/m3 24 hour – 20 mg/m3 10 minute – 500 mg/m3 1 year – 40 mg/m3 1 hour – 200 mg/m3	-6 mg/m3 -5 mg/m3 -5 mg/ m3 -20 mg/m3	Air Quality - Dust Particulate Matter (PM10) (Total suspended particles) -SO2 -NOx -CO	down should be done if dust levels are unacceptable.		decrease with watering.				-Main gate -Boiler section - Outside plant - Tank farm plant -Fan room
			Site Engineer to check and ensure that vehicles and equipment are maintained in order to reduce emission of exhaust fumes;	Regular inspections throughout the Construction Phase.	Exhaust fume emissions are controlled.	Maintenance Log book is available on site.	CML	Ongoing Cost through employed Site Engineer	
		Site Engineer to inspect and ensure that toilets are cleaned and maintained to avoid unpleasant odours.	Regular inspections throughout the Construction Phase.	Unpleasant odours are controlled.	Clean toilet environment free from unpleasant odours.	CML	N/A		
		Site Engineer to inspect and ensure waste is carefully managed and disposed of in designated places to prevent unpleasant odours.	Regular inspections throughout the Construction Phase.	Controlled waste disposal method.	Waste is dumped in designated places.	CML	Ongoing Cost through employed Site Engineer		

Copper Processing Plant - Mumbwa

Noise									
Leq (hourly), 70 dB(A)	70 dBA (6:00 – 21:00)	Ambient Noise	Sit Engineer to monitor noise and vibrations on an adhoc basis in order to establish noise levels at the project site and the nearest sensitive receptors and should not exceed 90-decibels.	Regular inspections throughout the Phase.	Noise levels at the nearest sensitive receiver are minimized.	Number of complaints of noise disturbance is controlled.	CML	Ongoing Cost through employed Site Engineer	-Main gate
			Site Engineer to check and ensure that working hours are limited to day light only;	Daily inspections throughout the Phase.	Sleep disturbance is minimized.	Number of complaints of sleep disturbance is minimized.	CML	Ongoing Cost through employed Site Engineer	-outside Boilers - Outside plant - Tank farm plant -Fan room
Landscape and Aesthetics									
		Landscape and Aesthetics	Site Engineer to make visual inspection of earth works to ensure that excessive excavation other than those agreed upon is not carried out, particularly at borrow pit sites, temporary and	Daily inspections throughout the Phase.	Landscape alterations are reduced to a minimum.	Final landscape and aesthetic view is compatible with the surrounding environment.	CML	Ongoing Cost through employed Site Engineer	

Copper Processing Plant - Mumbwa

			approach roads and around the contractor's camp.						
Hazardous Wastes Waste									
	No hazardous waste disposal site in Zambia	-Lubricant -Contaminated cloth -Light tube -Battery -Ink -Waste from lab Contaminated bags	All hazardous waste is stored in a bunded wall locked before taken for disposal by a ZEMA licensed contractor. Burnt by external authorize agency	Weekly inspections throughout the Phase.	minimized hazardous waste at the plant	quantities of waste on the storage site	CML	Ongoing Cost through employed Site Engineer	-Production, Utility -Factory Utility -Office QA, -Waste water treatment Utility

The following table illustrates the different stakeholders and their monitoring responsibilities and reporting.

Table 9-0.3: Monitoring and Reporting Responsibilities

Stakeholder	Overall environmental performance of the Project	Discussions with Engineering Manager
CML	<ul style="list-style-type: none"> Monitoring the implementation of EMP 	<ul style="list-style-type: none"> Regular environmental progress reports to stakeholders
	<ul style="list-style-type: none"> Overall environmental performance of the Project 	
Safety manager-CML	<ul style="list-style-type: none"> Implementation of mitigating measures for air, water, etc. 	<ul style="list-style-type: none"> Regular environmental reports to ZEMA Maintenance records Accidents reports Mitigating actions
	<ul style="list-style-type: none"> Environmental management of worksites 	
	<ul style="list-style-type: none"> Develop Waste management Plan 	
	<ul style="list-style-type: none"> Rehabilitation of abandoned worksites 	
	<ul style="list-style-type: none"> Performance of equipment 	
	<ul style="list-style-type: none"> Accidents (trips, pollution spills, etc.) 	
	<ul style="list-style-type: none"> Negative social and environmental impacts 	
	<ul style="list-style-type: none"> Environmental performance of equipment 	
	<ul style="list-style-type: none"> Implementation of mitigating measures 	
	<ul style="list-style-type: none"> Occupational health and safety plan 	
	<ul style="list-style-type: none"> Traffic and worksite accidents report 	
	<ul style="list-style-type: none"> Air quality 	
External Consultant	<ul style="list-style-type: none"> Negative social and environmental impacts 	<ul style="list-style-type: none"> Complaints to Safety manager

10. DISCUSSION CONCERNING AREAS AND ISSUES WHERE INFORMATION IS INCOMPLETE

The consultant (ESEC LTD) endeavored to obtain as much information as possible when preparing the Environmental Impact Statement (EIS). However, there are no national standards on noise and vibration; moreover, lack of measuring equipment for these aspects also posed a challenge. Literature search conducted for the project area did not yield any valuable information to benchmark findings in the field.

11

DECOMMISSIONING AND CLOSURE PLAN

11. DECOMMISSIONING AND CLOSURE PLAN

11.1 Objectives

The main objectives of the decommissioning plan will be to:

- Ensure the safety of site and workers in the vicinity of the plant site
- Prevent potential significant adverse effects on adjacent environs
- Return the land to conditions capable of supporting the former land use, or where this is not practical, or feasible, an alternative sustainable land use
- Promote alternative economic activities in the area that are sustainable in the future

11.2 Decommissioning and rehabilitation investigations

Prior to commencing decommissioning activities, investigations and risk assessment will be undertaken as follows:

11.2.1 Preliminary investigations

- Evaluation of general conditions and background information
- State of environment prior to establishment of the copper processing plant
- Documentation of all activities during operational phase
- Documentation of any environmental incidents during operations
- Preliminary evaluation of contaminants present at the site and their likely properties and behavior
- Evaluation of available planning data and architectural map
- Results of environmental monitoring studies

11.3 Decommissioning of infrastructure

11.3.1 Buildings

The infrastructure includes officers, laboratories, warehouses, lavatories, guard rooms etc. The following measures will be applied to the mentioned structures:

- Breaking and removal of walls and concrete foundation
- Removal of pillars and related concrete foundations
- Demolishing of steel and removal of its concrete foundation and pipes
- General site clean-up

Site leveling and re-profiling will be done to re-establish the natural pattern across the site, after which, the site could be utilized for other facilities or activities. All materials and equipment that cannot be reused, recycled, or sold will be disposed of at an approved non-hazardous disposal site.

DECOMMISSIONING OF PLANT INFRASTRUCTURE AND ITS IMPACTS

As indicated in the foregoing and table below, the area will be re-profiled to establish the natural drainage pattern. All reusable and recyclable materials and scrap of good value will be salvaged and sold off. Site leveling and re-profiling shall be done to re-establish the natural drainage pattern across the site, after which, the site shall be re-vegetated with

indigenous grasses and trees. All materials and equipment that cannot be reused recycled or sold shall be disposed of at an approved non-hazardous disposal site. The following activities are anticipated to be carried out:

Site Drainage Systems

After cessation of operations, drainage channels and open surfaces will be re-profiled with the additional soil amendment material such as rock from elsewhere, previously stripped topsoil, and organic matter and re-vegetated. The re-shaping and grading of a site is essential for rehabilitation to ensure that the final landform is hydrological compatible with surrounding areas. This entails making slopes stable and less prominent.

Re-vegetation

For the purposes of re-vegetation, the proposed project will collaborate with the Forestry Department who already has a nursery of indigenous plant tree species in Mumbwa. All the preparatory works will be completed before the time when the seeds are most likely to experience the conditions they need to germinate and survive such as reliable rainfall and suitable temperatures.

Monitoring

The monitoring plan and its implementation shall be spearheaded by the different government departments. These shall particularly be the Zambia Environmental Management Agency (ZEMA) WARMA, and the Mumbwa Town council. The current engagement with the Provincial department is creating a platform from which this backstopping can be achieved, once the thermal power plant cease and the site decommissioned.

11.4 General site rehabilitation budget

A sum of \$ **440,000** has been estimated in the reclamation cost for the general site breaking, levelling and reprofiling.

Table 11.1: Cost estimates of Reclamation

Issue	Action	Implementing Organisation	Responsible Organisation	Duration	Estimated Cost (\$)
Process equipment	Transportation and disposing of equipment in appropriate scrap yards and waste disposal site	Scrap metal dealers to dismantle process equipment and salvage operational equipment like motors and pumps CML management	CML management Contractor	8 Weeks	150,000
Soil	Removal of concrete foundations and covering over with top soil.	Civil Engineering firms CML management	CML management Contractor	One Month	50,000
Offices and ancillary buildings like workers houses	Change of use of buildings on site to suite operational changes after decommissioning of plant	CML management to obtain local authority approval Implementation through civil engineering firm	CML management Contractor	Four Week	90,000
Decommissioning program/Report	Writing a decommissioning report and submit a copy to ZEMA	CML management	CML management Contractor	Two weeks	15,000
TOTAL					305,000

12

EMERGENCY PREPAREDNESS AND RESPONSE PLAN

12. EMERGENCY PREPAREDNESS PLAN (EPP)

12.1 Scope

The EPP plan is necessary to protect the health, safety, and welfare employees, customers and visitors at the plant and to provide for the protection of the facility and personnel during any emergency situation.

The EPP will include, at a minimum, the following basic components:

- How to report fires and other emergencies
- Emergency evacuation procedures and routes.
- Procedures to be followed by employees (if any) who remain to conduct some critical functions before they evacuate.
- Procedures to account for all employees after emergency evacuation.
- Rescue and medical duties for those employees (if any) who are designated to perform them.
- Names and phone numbers of persons who can be contacted for further information on the emergency plan.

Through the use of regularly scheduled safety procedures, training programs, and operational procedures, management will disseminate and train selected personnel in identifying conditions that might lead to emergency conditions. Customers and visitors will be instructed, as part of their orientation, in the steps to take to prevent and report emergency situations when these conditions are found to exist.

Listed below are specific procedures that shall be addressed by management to minimize the occurrence of and impact from a fire emergency. There are no unusual fires present in the area but attention shall be paid to sudden fires. Special emphasis at the storage areas shall be placed on housekeeping and storage practices and office areas because flammable and combustible materials may be used and stored there e.g. computers and valuable files.

Management shall be committed to preventing the occurrence of fires and situations that may promote a fire.

All fire protection equipment will be inspected and results of inspection recorded. Equipment to be inspected will include fire extinguishers and any other deemed worth. All areas will be inspected to check for the following unsafe conditions: -

- Poor housekeeping procedures
- Smoking in non-designated areas (if any)
- Flammable/combustible materials not stored properly

12.2 Procedures for Fires

Fire discovered by employee

- For localized fire, put it off before it spreads;
- For storage area, clear the area of all other personnel and visitors. Instruct all personnel to evacuate the facility.
- Confine the fire
- Activate the fire alarm (if available).

First Aid

First aid kits should be fully stocked, strategically located, and properly maintained. Never give more than immediate, temporary care.

Equipment and supplies should be chosen in accordance with the recommendations of health providers and service should be rendered only as covered by written, physician-approved standard procedures. First aid attendants should be duly qualified and certified.

Emergency Response Coordinator

Responsibilities of the Emergency Response Coordinator will include the following:

- To develop the site specific Emergency Response Plan in co-ordination with the management, on-site security personnel and the local emergency services such as the Police, Fire Brigade, Hospital etc.;
- Establishing an Emergency Control Centre at the site in coordination with the local Fire, Rescue and Police Authorities and establishing emergency communications systems;
- Selecting, appointing, organizing and training of personnel of the Emergency Response Team;
- Designating evacuation paths, assemblage areas;
- Ensuring that all employees and staff members are knowledgeable of emergency alarms, actions, and evacuation procedures.
- Assuring emergency equipment is operating and readily available (emergency medical kits, flash lights, evacuation chairs, fire equipment etc.
- Ensuring that the Emergency Response Plan is kept current.

All employees are responsible for familiarizing themselves with the procedures set forth in the Emergency Response Plan. The Emergency Response Plan will provide procedures to follow during anticipated emergency situations such as.

- Fire
- Explosion in buildings
- Extended power outages / Elevator / equipment failure
- Traffic Accident Flood
- Personnel / public violent behavior or disturbances
- Robbery

Copper Processing Plant - Mumbwa

Table 12.1: Emergency Response Plan

S/n	EMERGENCY SITUATION	CAUSE	PROPOSED RESPONSE	RESPONDENTS
1.	Fuel Spillage	<ul style="list-style-type: none"> • Undue stress on tank and product lines or aged facilities • Human error e.g. overfilling tanks • Faulty equipment 	<ul style="list-style-type: none"> • Switch of power, • Stop all operations • Create sand bunding around spillage point • Scoop or sponge/soak out spilled product • Clean up site • Document incidence • Report to Zambia Police, ZEMA and ERB 	<p>Key Respondent: Emergency Respondent on Duty</p> <p>Other Respondents: Other Workers, Local Fire services</p>
2	Fire Outbreak	<ul style="list-style-type: none"> • Neglect of safety procedures • Faulty electric connections • Carelessness e.g. smoking in non-smoking areas 	<ul style="list-style-type: none"> • Sound alarm and direct people on site to assemble at Fire Assembly point for safety • Conduct roll Call • Fight the fire using appropriate tools (fire extinguisher, sand, water) • Inform Zambia Police and Mumbwa Town Council • Isolate area with barrier tape • Clean up site • Document incidence • Report to Zambia Police, ZEMA and ERB 	<p>Key Respondent: Emergency Respondent on Duty</p> <p>Other Respondents: Manager, Other Staff Local Fire services, Zambia Police</p>
3	Staff Injury	<ul style="list-style-type: none"> • Failure to adhere to safety procedures • Unskilled labor • Faulty equipment • Sheer accident 	<ul style="list-style-type: none"> • For minor injuries apply appropriate First Aid • For major injuries take to hospital • Document incidence 	<p>Key Respondent: First Aid Attendant on Duty</p> <p>Other Respondents: Station Manager, Hospital Staff, Zambia Police</p>
4	Wastewater spillage from sewer facilities	Setting a limit for cleaning and monitoring to ensure levels are maintained below	<ul style="list-style-type: none"> • Clean up of contaminated sites • Inform ZEMA, WARMA, if large area affected or potential wash down to surface or ground water resources has occurred • Contain the spill using appropriate bunding material such as soil • Check and address causative factor e.g. unblock clogged system • Document incidence 	<p>Key Respondent: Station Manager</p> <p>Other Respondents: Other staff</p>

13

CONCLUSION

13. CONCLUSION

Having assessed the project activities in terms of the technology and project design (site layout) against the existing physical, biological, and socio-economic environment through desk research, field observation, and indeed stakeholder engagement, it has been established that the proposed copper processing plant area will not be impacted negatively by the proposed facility. Thus, it will impact less negatively on the three major components of the environment.

This undertaking is within a partially cleared area and most of the environmental impacts during the construction and operational phase of the project will be positive and the following are among the notable ones: -

- Improvement of the Zambia's financial standing;
- Provide direct employment opportunities for the skilled, semi-skilled and casual workers during the three phases;
- Boost local economy;
- Contribute to enhancing the nation's economy through paying taxes

It is clear from this study that a proposed plant of this nature will have both environmental and socio-economic impacts on the surroundings, most of which are positive. Currently, with the recent increase in demand of the commodity in the country, the needs for better environmental have also increased. This project will help meet this increase in demand.

The main negative impacts that will result from a project of this nature is:

- Generation of waste potentially becoming a pollutant
- Traffic and Safety

However, following the analysis of the risks, adequate mitigation measures will be implemented and closely monitored, rendering these impacts insignificant.

It is proposed that the development as described in this report meets the requirements for approval on the basis that:

- Health and safety regulations will be implemented according to National Standards throughout the project.
- Waste generated will be disposed of safely and within the regulations set by ZEMA and the Mumbwa Town Council.
- Design of the site and subsequent development activities will consider Environmental preservation as the primary objective.
- Traffic Control and other safety improvements will be done in liaison with RTSA, RDA and CTC

14. DECLARATION OF AUTHENTICITY

Julian Liu

I,the undersigned, certifies and declares that the information presented in this Environmental Impact Statement (EIS) is both factual and accurate and represents the proposed project. This EIS conforms to the requirements of the Environmental Impact Assessment Regulations, SI 28 of 1997 with regard to the development of Environmental Management Plans.

We further declare that the concerns raised by stakeholders at the time of carrying the consultations have been taken into account in preparing this EIS Report.

We acknowledge that the proposed project will be implemented in accordance with the applicable Zambian legal and administrative framework.

For and on behalf of **Cedars Minerals Limited**.



.....
Mr. Julian Liu
Director
Cedars Minerals Limited

15. REFERENCES

- Carruthers, V. (ed.) (2008). *The Wildlife of Southern Africa: The larger illustrated guide to the animals and plants of the region*. Struik Publishers, Cape Town, South Africa.
- Chidumayo E.E (1987) species structure in Zambia miombo woodland. *Journal of tropical ecology* 3: 109-118
- Cotterill, F.P.D. and Maree, S. (2008). *Fukomys anselli*: The IUCN Red List of Threatened Species 2008: e. T44858A10956247
- Earthwise.(2016). Hydrogeology of Zambia. Available at: http://earthwise.bgs.ac.uk/index.php/Hydrogeology_of_Zambia#Geology. (Accessed 11 January 2020).
- ECZ – 1997 : Statutory Instrument No.28 of 1997. *The Environmental Impact Assessment Regulation*, Chisamba, Zambia
- ECZ – 2000 *State of the Environment in Zambia*, Lusaka, Zambia.
- Environmental management (licensing) regulations S.I No 112 of 2013
- Fanshawe D.B (1971): *The vegetation of Zambia*. First resources bulletin No. 7 Republic of Zambia.
- GRZ (1986). *Soil Map of Zambia, classification of Map units according to FAO/UNESCO soil Map of the World Legend*. GRZ, Lusaka, Zambia.
- GRZ (1986). *Soil Map of Zambia, classification of Map units according to FAO/UNESCO soil Map of the World Legend*. GRZ, Lusaka, Zambia.
- GRZ 1965: *The Republic of Zambia Soil Map Compiled from the Information Supplied by the Soils Section, Research Branch, Department of Agriculture*, Lusaka, Zambia
- GRZ 1985: *The National Conservation Strategy for Zambia*. U.K.
- GRZ 1990: *Environmental Protection and Pollution Control Act*, Lusaka, Zambia
- GRZ, 1997. *The Environmental Impact Assessment Regulations, 1997*. Statutory Instrument No. 28 of 1997. Government Printers, Lusaka, Zambia.
- GRZ, 2011. *Environmental Management Act No. 12 of 2011*. Government Printers, Lusaka, Zambia.
- IUCN. (1996). *1996 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland and Cambridge, UK. 448 pp
- IUCN. (1996). *1996 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland and Cambridge, UK. 448 pp
- Kwesiga, F. and Kamau, I.N. (1989). Eds: *Agroforestry potential in the unimodal upland plateau of Zambia*, AFRENA Report No. 7. ICRAF, Nairobi, Kenya, 115 pp.
- Kwesiga, F. and Kamau, I.N. (1989). Eds: *Agroforestry potential in the unimodal upland plateau of Zambia*, AFRENA Report No. 7. ICRAF, Nairobi, Kenya, 115 pp.
- Sinclair, I and Ryan, P. (2010). *Birds of Africa, south of the Sahara: second edition, 500 new images*. Struik Nature, Cape Town, South Africa.
- Sinclair, I and Ryan, P. (2010). *Birds of Africa, south of the Sahara: second edition, 500 new images*. Struik Nature, Cape Town, South Africa.
- SSSRBMAZ (1991). *Exploratory Soil Map of Zambia: Scale 1: 1,000,000*. Government of the

Republic of Zambia, Lusaka, Zambia.

The environmental protection and pollution control act

Storrs, A.E.G. (1995). Know your trees. Some of the common trees found in Zambia. Regional Soil Conservation Unit, Nairobi, Kenya.

Wikipedia. (2022). List of Mammals of Zambia. Available at: https://en.wikipedia.org/wiki/List_of_mammals_of_Zambia.

16. APPENDICES

Appendix A: Curriculum Vitae of the EIA Study Team Members.

Appendix B: Scoping & Disclosure Meeting Advert.

Appendix C: Certificate of Incorporation

Appendix D: Certificate of Title

Appendix E: Copper Processing Plant Layout

Appendix F: Water, Noise, And Air Quality Report

APPENDIX A1: CURRICULUM VITAE

Patson Zulu

Position Title and No.	TEAM LEADER
-------------------------------	-------------

Surname: **ZULU**

First Name: **PATSON**

CURRICULUM VITAE (CV)

Position Title and No.	
Name of Expert:	PATSON ZULU
Date of Birth:	27/01/1960
Country of Citizenship/Residence	ZAMBIA

Education:

Name of Institution/University - City - Country	Period		Diploma Obtained	Main Topic / Major
	From	To		
ANTI-CORRUPTION COMMISSION-LUSAKA ZAMBIA	NOV,2015	NOV,2015	POSTGRADUATE CERTIFICATE	INTEGRITY COMMITTEE INDUCTION
INSTITUTE OF DIRECTORS-LUSAKA-ZAMBIA	MAR,2009	MAR,2009	POSTGRADUATE CERTIFICATE	CORPORATE GOVERNANCE
INSTITUTE OF DIRECTORS-LUSAKA-ZAMBIA	JULY,2006	JULY,2006	POSTGRADUATE CERTIFICATE	MANAGEMENT DEVELOPMENT PROGRAMME FOR SENIOR MANAGERS- MANAGERIAL SKILLS AND CAPABILITIES, PLANNING PROCESS, STRATEGY FORMULATION AND CONTROL, MANAGING CHANGE
INSTITUTE OF DIRECTORS-SIAVONGA-ZAMBIA	JULY,2005	JULY,2005	POSTGRADUATE CERTIFICATE	STRATEGIC MANAGEMENT WORKSHOP FOR MANAGERS
ZAMBIA INSTITUTE OF ADVANCED LEGAL EDUCATION (ZIALE)-LUSAKA-ZAMBIA	NOV 2003	NOV 2003	POSTGRADUATE CERTIFICATE	INVESTIGATORS AND PROSECUTORS COURSE
BONN, GERMANY	DEC 2001	DEC 2001	POSTGRADUATE CERTIFICATE	ENVIRONMENTAL MANAGEMENT TOOLS
NIVERSITY OF THEWITWATERSRAND U-JOHANNESBURG-SOUTH AFRICA	21 FEB 2000	25FEB 2000	POSTGRADUATE CERTIFICATE	ENVIRONMENTAL ASSESSMENT
SWEDEN	Mar 1999	April 1999	POSTGRADUATE CERTIFICATE WITH HONOURS	ISO-14000 - ENVIRONMENTAL MANAGEMENT SYSTEMS

HOKKAIDO INSTITUTE OF ENVIRONMENTAL SCIENCES-SAPPORO-JAPAN	Sept 1996	Nov. 1996	POSTGRADUATE CERTIFICATE	PLANNING ON REGIONAL ENVIRONMENTAL PRESERVATION
MILJOKONSULTERNA-NYKOPING-SWEDEN	April 1995	May 1995	POSTGRADUATE CERTIFICATE	ADVANCED HAZARDOUS WASTE MANAGEMENT
DRESDEN, GERMANY	Nov 1993	Dec 1993	POSTGRADUATE CERTIFICATE	ADVANCED WASTE MANAGEMENT
THE UNIVERSITY OF ZAMBIA-LUSAKA-ZAMBIA	1980	1984	BACHELOR OF SCIENCE DEGREE	CHEMISTRY

PROFESSIONAL TRAINING

Name/Place of Training Institution- City - Country	Type of Training	Period		Certificates or Diploma Obtained
		From	From	
ZAMBIA BUREAU OF STANDARDS- LUSAKA-ZAMBIA	QUALITY MANAGEMENT SYSTEM:IMPLEMENTATION and INTERNAL AUDIT: ISO 9001 and ISO 19011:2018	9 JAN,2021	13 JAN, 2021	CERTIFICATE OF TRAINING
ZAMBIA BUREAU OF STANDARDS- LUSAKA-ZAMBIA	ENVIRONMENTAL MANAGEMENT SYSTEMS: IMPLEMENTATION : ISO 14001:2015	16 JAN,2021	17 JAN,2021	CERTIFICATE OF TRAINING
FRINGILLA LODGE-KITWE-ZAMBIA	STRATEGIC ENVIRONMENTAL ASSESSMENT	10 OCT,2010	13 OCT,2010	CERTIFICATE OF ACHIEVEMENT
THE UNIVERSITY OF ZAMBIA-LUSAKA-ZAMBIA	MINING AND THE ENVIRONMENT	9 OCT,2002	12 OCT,2002	CERTIFICATE OF ACHIEVEMENT
DET NORSKE VERITAS-LUSAKA	PROJECT MANAGEMENT	20 FEB,2001	23 FEB,2001	TRAINING CERTIFICATE
GABORONE-BOTSWANA	SADC INDUSTRIAL POLLUTION PREVENTION SEMINAR	FEB 2001	FEB 2001	ATTENDANCE CERTIFICATE
ENVIRONMENTAL COUNCIL OF ZAMBIA-CHISHIMBA-ZAMBIA	CLIMATE CHANGE TRAINING FOR GOVERNMENT PLANNING OFFICERS AND KEY STAKEHOLDERS	10 APR,2000	14 APR,2000	TRAINING CERTIFICATE
KENYA	CLEANER PRODUCTION ROUNDTABLE CONFERENCE FOR AFRICA	2000		CERTIFICATE OF ACHIEVEMENT
ENVIRONMENTAL COUNCIL OF ZAMBIA-CHISHIMBA-ZAMBIA	ENVIRONMENTAL IMPACT ASSESSMENT REVIEW	6 DEC,1999	10 DEC,1999	ATTENDANCE CERTIFICATE
KENYA	EXPERT GROUP ONWASTE MANAGEMENT FOR AFRICA	1998		ATTENDANCE CERTIFICATE
NAIROBI KENYA	GROUP EXPERT WORKSHOP ON MUNICIPAL SOLID WASTE MANAGEMENT	DEC 1997		ATTENDANCE CERTIFICATE
DAR-ES-SALAAM-TANZANIA	ECOLOGICALLY SUSTAINABLE INDUSTRIAL DEVELOPMENT	OCT 1997		ATTENDANCE CERTIFICATE
GABORONE, BOTSWANA	3RD SADC WASTE MANAGEMENT CONFERENCE	JUNE 1997		ATTENDANCE CERTIFICATE

LUSAKA ZAMBIA	NATIONAL WORKSHOP ON CLEANER PRODUCTION FOR CHIEF EXECUTIVES AND DECISION MAKERS FROM INDUSTRY, NGOS, ACADEMIA AND LOCAL GOVERNMENT	NOV 1997	NOV 1997	ATTENDANCE CERTIFICATE
SAPPORO-JAPAN	PLANNING ON REGIONAL ENVIRONMENT PRESERVATION	4 SEPT,1996	18 NOV, 1996	SPECIAL TRAINING CERTIFICATE
DRESDEN UNIVERSITY OF TECHNOLOGY AND UNITED NATIONS ENVIRONMENT PROGRAMME- GERMANY	ENVIRONMENTAL MANAGEMENT FOR DEVELOPING COUNTRIES- WASTE MANAGEMENT	10 NOV, 93	10 DEC,93	CERTIFICATE OF PROFICIENCY

Employment record:

Period	Employing organization and your title/position. Contact information for references	Activities Performed	Title / Positions	Country	Summary of activities performed relevant to the Assignment
May 2019 to Present	ENVIRONMENTAL SCIENCE AND ENGINEERING CONSULTANTS LTD	CONSULTANCY	<ul style="list-style-type: none"> • LEAD CONSULTANT • TEAM LEADER 	ZAMBIA	<ul style="list-style-type: none"> • LEAD CONSULTANT/ TEAM LEADER FOR ; <ul style="list-style-type: none"> ➤ FEASIBILITY STUDY FOR IMPROVED SOLID WASTE MANAGEMENT SYSTEM IN CHOMA DISTRICT BY CHOMA MUNICIPAL COUNCIL AND GIZ ➤ ENVIRONMENTAL MANAGEMENT SYSTEM IMPLEMENTATION ➤ QUALITY MANAGEMENT SYSTEM; IMPLEMENTATION AND INTERNAL ENVIRONMENTAL AUDITS ➤ ENVIRONMENTAL IMPACT ASSESSMENT ➤ ENVIRONMENTAL PROJECT BRIEFS

July 2003 to Feb. 2018	ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY	ENVIRONMENTAL MANAGEMENT	<ul style="list-style-type: none"> • MANAGER, NORTHERN REGION • MANAGER FOR THE INSPECTORATE • CLEANER PRODUCTION MANAGER 	ZAMBIA	<ul style="list-style-type: none"> • MANAGEMENT AND SUPERVISION OF INSPECTORATE WORK, COMMUNICATION, AND ACCOUNTS FOR ZEMA. • ADVISED AND EDUCATED THE PUBLIC AND REGULATED PARTIES ABOUT ENVIRONMENTAL ISSUES, REGULATIONS, POLICY, AND COMPLIANCE. • PROVIDED CLIENTS WITH GUIDANCE ON HOW TO COMPLY WITH ENVIRONMENTAL REGULATIONS • CONDUCTED ALL TESTS IN ACCORDANCE TO THE ZAMBIA ENVIRONMENTAL REGULATIONS AND THEN DETERMINED THE COMPOSITION OF THE AIR, WATER AND GASES
July 1999 to June 2003	ZAMBIA ASSOCIATION OF CHAMBERS OF COMMERCE AND INDUSTRY (ZACCI)	TRAINING OF OFFICERS IN CLEANER PRODUCTION METHODOLOGY	CLEANER PRODUCTION MANAGER	ZAMBIA	<ul style="list-style-type: none"> • ZAMBIAN MANAGER AND COUNTERPART MANAGER FOR DETNORSKE VERITAS OF NORWAY TO TRAIN ZAMBIAN INDUSTRIES IN CLEANER TECHNOLOGY AND CLEANER PRODUCTION OF GOODS AND SERVICES. COORDINATED VARIOUS WORKS UNDER ZAMBIA ASSOCIATION OF CHAMBERS OF COMMERCE AND INDUSTRY (ZACCI).
	ENVIRONMENTAL COUNCIL	ENVIRONMENTAL	SENIOR INSPECTOR/PROJECT	ZAMBIA	<ul style="list-style-type: none"> • INDUSTRIAL POLLUTION AND

1992-1999	OF ZAMBIA	MANAGEMENT	COORDINATOR		<p>CLEANER TECHNOLOGY</p> <ul style="list-style-type: none"> • WASTE MANAGEMENT • PROJECT JOINTLY EXECUTED BY THE ENVIRONMENTAL COUNCIL OF ZAMBIA (ECZ) AND THE LUSAKA CITY COUNCIL (LCC) TO DIAGNOSE LUSAKA MUNICIPAL SOLID WASTES (Team leader- waste characterization for Lusaka District) • DEVELOPED AND IMPLEMENTED AN ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) IN A ZAMBIAN INDUSTRY, TOGETHER WITH DET NORSKE VERITAS (DNV) OF NORWAY • FORMULATION OF WASTE MANAGEMENT REGULATIONS AS DELEGATED LEGISLATURE OF THE ENVIRONMENTAL PROTECTION AND POLLUTION CONTROL ACT OF 1990
1985 to 1992	NITROGEN CHEMICALS OF ZAMBIA	PRODUVTION OF FERTILISERS	PROCESS ENGINEER/LABORATORY CHEMIST	ZAMBIA	<ul style="list-style-type: none"> • DEVELOPMENT OF MASS BALANCE AND ENERGY BALANCE TECHNIQUES, SIMPLE PROCESS MODIFICATIONS AND DESIGN. • ORGANISE TRAINING MATERIALS FOR PLANT TECHNICIANS • QUALITY CONTROL, RESEARCH AND DEVELOPMENT

Membership in Professional Associations and Publications:

- i. PATSON ZULU ET AL (1996) SOLID WASTE MANAGEMENT MASTER PLAN PROJECT DOCUMENT FOR THE CITY OF LUSAKA (DIAGNOSIS)
- ii. "ZAMBIA RAILWAYS ENVIRONMENTAL ASSESSMENT STUDY" - PATSON ZULU AND ZEBEDIAH PHIRI; OCTOBER 1999.
- iii. PATSON ZULU ET AL (2002) 'ENVIRONMENTAL MANAGEMENT SYSTEM FOR ZAMBIA RAILWAYS'

Language Skills (indicate only languages in which you can work): ENGLISH, NYANJA AND BEMBA

Detailed Tasks Assigned on Consultant's Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capabilities to handle the assigned work
1. Document Reviews including existing legal frameworks relevant to the projects	1. Review of relevant documents for <ol style="list-style-type: none"> i. Feasibility study for improved solid waste management system in choma district by choma municipal council and GIZ ii. Waste characterization for Lusaka District (1996) iii. A proposed Water Pipeline Project for Ramoji Resources in Salamano area Kalulushi District under Environmental Science and Engineering Consultant Limited. iv. Also lead Team Experts to a review process for various other environmental impact assessment projects highlighted on the ESEC LTD Company experience
2. Lead the team preparing the inception Report	2. Team Leader and Environmental Expert for the team that prepare the inception report for Feasibility study for improved solid waste management system in choma district by choma municipal council and GIZ, Ramoji Resources for the proposed Copper Processing Plant and Water Pipeline Project in Salamano area of Chambishi in Kalulushi District and Waste Characterization for Lusaka District
3. Lead the team preparing the EIA terms of Reference for submission to ZEMA	3. Environmental Project Brief proposed Molasses based ethanol plant By Consolidated Farming Limited in Shibuyunji District under Environmental Science and Engineering Consultant Limited. Environmental impact Assessment for proposed Manganese mine in Kaufuma area, Mkushi District by Status Mineral Limited ,2021 Environmental impact Assessment for an existing Ndambo dam in Chaminuka area, Chongwe district by Zambezi Ranching and cropping Limited,2020 Environmental project brief for the construction of a filling station in kalomo district by Zam fuel Petroleum, 2020 Environmental project brief for the Large scale coal prospecting and

	<p>exploration project in Chamana area, Sinazongwe district by Zambian Weiye Limited, 2020</p> <p>Environmental impact Assessment for Development of Mixed Crops farm on Kundalila road in Serenje district,2020</p> <p>Environmental impact Assessment for the Existing Copper oil processing plant in Lusaka by Parrogate Ginneries LTD,2020</p> <p>Environmental project brief for the construction of campsites and use of Existing borrow pits for the water and sanitation improvement works in Mansa and Samfya by China Civil Engineering Construction Corporation (CCECC) and Ministry of water development, Sanitation and Environmental protection (MWDSEP), 2020</p> <p>Feasibility study for improved solid waste management system in Choma District by Choma municipal council and GIZ, 2019.</p> <p>Environmental impact Assessment for the Construction of the China aided International Conference center in Lusaka by Ministry of Housing and Infrastructure Development (MHID), 2019</p>
<p>4. Review of the compiled Draft ToRs, Scoping Report and Specialized reports into a Draft EIS for submission to ZEMA</p>	<p>4. Reviewed the Compiled and drafted EIS under Environmental Science and Engineering Consultant Limited.</p>

Expert's contact information: e-mail patsonzulu@gmail.com Phone: 0977 470849/0955833581/0967470849

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available, as and when necessary, to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

	
Name	Signature

Abiud Banda

Position Title and No.	ENVIRONMENTAL ENGINEER (Water, Air & Noise) & GIS SPECIALIST
Name of Expert:	Abiud Banda
Country of Citizenship/Residence	Zambia

Education:

Master's Degree (Currently enrolled) in Geo-information Science (GIS) and Earth Observation, University of Zambia, Zambia.

Bachelor's Degree in Environmental Engineering, Copperbelt University (2011 – 2016), Kitwe, Zambia.

GSCE G12 Division one certificate, Chizongwe Technical School (2007 - 2009 Year), Chipata, Zambia

Employment Record relevant to the Assignment:

Period	Employing Organization And Position. Contact Information	Country	Summary Of Activities Performed Relevant To The Assignment
May 2019 to Present	Environmental & GIS Specialist - Environmental Science & Engineering Consultants Limited 10 Jacaranda Road, Town Centre, NDOLA	Zambia	Environmental Consultant - Environmental impact Assessment for the Construction of a filling station at Garneton turnoff in Kitwe by African Grey Limited,2018 Environmental Consultant - Environmental impact Assessment for the Construction of a filling station at Nakadoli in Kitwe by African Grey Limited, 2018 Environmental Consultant - Environmental impact Assessment for the Construction of a filling station in Masala, Ndola by Usangu Logistics Limited,2018 Environmental Specialist - Environmental Assessment for the decommissioning of fuel storage facility by Syngenta Zambia Limited,2019
March 2017 to March. 2018	Waste Management Inspector, Northern Region, Zambia Environmental Management Agency	Zambia	<ul style="list-style-type: none"> •Advised and educated the public and regulated parties about environmental issues, regulations, policy and compliance. •Provided clients with guidance on how to comply with environmental regulations •Conducted all tests in accordance to the Zambia environmental regulations and then determined the composition of the air, water and gases.
2015	Environmental Engineer, Mulonga Water and Sewerage Company	Zambia	<p>Evaluated architectural designs for existing pipe networks □ Supervised sewer, manhole cover designs, unblocking and water treatment plans</p> <p>Examined and updated sanitary inspection log entries on a regular basis</p>

			<p>Ensured all needed permits and clearances were obtained and all job cards worked on time</p> <p>Ground water pollution spatial distribution in Kamuchanga and AEL compound</p>
--	--	--	---

Membership in Professional Associations and Publications:

1. Graduate Member- Engineering Institution of Zambia
2. Poster presentation: "Mobile Micro sensors for air monitoring, Lusaka show ground 2016 at Copperbelt University stand
3. Poster presentation: "Mobile Micro sensors for air monitoring, Pretoria, South Africa, May 2017 at SAIMM Young Professional Conference (YPC).
4. Project: "Designing and building a low cost wireless mobile micro sensor for air pollution monitoring, Environmental Lab, CBU 2015 to Department of Environmental lecturers, Kitwe
5. NSTC Presentation: "Designing and Building Mobile Micro-Sensor Prototype for Air Quality Monitoring, School of mathematics and natural sciences conference room, July 2016 to National Science and Technology Council, CBU, Kitwe
6. Industrial Seminar: "Designing and Building Mobile Micro-Sensor Prototype for Air Quality Monitoring, Lunte Lodge, September 2017 to Mopani Copper Mines, Konkola Copper Mines, CMLumbila Mines, Lumwana Mining Limited, Nkana Water & sewerage Company, National Science and Technology Council and CBU Researchers, Kitwe

Language Proficiency: Fluent in English, Bemba, and Nyanja

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capabilities to handle the assigned work
1. Document Reviews including existing legal frameworks relevant to the projects	1. Review of relevant documents for a proposed Water Pipeline Project for Ramoji Resources in Salamano area CMLulushi District under Environmental Science and Engineering Consultant Limited.
2. Part of the team preparing the EIA terms of Reference for submission to ZEMA	2. GIS and Environmental Expert for the proposed Molasses based ethanol plant By Consolidated Farming Limited in Shibuyunji District under Environmental Science and Engineering Consultant Limited.
3. Part of the Scoping meeting to be held at the Proposed Project site	3. GIS and Environmental Expert for various other environmental impact assessment projects highlighted on the ESEC LTD Company experience.
4. Collection of satellites maps for the proposed site	4. Data captured for a proposed filling station project by ACM Products Limited at Copperhill Mall Kitwe District
5. Map Production for the Project Site	5. Produced maps for the proposed Diesel Storage tank Project at Mineral Junxion Limited in Kitwe District, 2019

<p>6. Compilation of Draft ToRs, Scoping Report and Specialized reports into a Draft EIS for submission to ZEMA</p>	<p>6. Compiled and drafted the EIS for the proposed Copper Processing Plant in Salamano Area of CMLulushi District conducted in 2018 under Environmental Science and Engineering Consultant Limited.</p>
<p>7. Incorporate comments from stakeholders and ZEMA into a final of EIS document</p>	<p>7. Incorporated comments from ZEMA for the proposed Copper Processing Plant in Salamano Area of CMLulushi District conducted in 2018 under Environmental Science and Engineering Consultant Limited.</p>

References

<p>Patson Zulu (0967470849) Chairman and CEO Environmental Science & Engineering Consultants Limited 10 Jacaranda Road, Town Centre Ndola</p>	<p>Lillian C. CMLenge, Principal Inspector – Waste Management, Zambia Environmental Management Agency (ZEMA) P.O. Box 71302, Ndola. Email: ICMLenge@gmail.com/ ICMLenge@zema.org.zm Cell: +260955292799</p>
<p>Dr. Phenny Mwaanga, Project Supervisor - Ecotoxicology Lecturer, The Copperbelt University, School of Mines & Mineral Sciences, P.O. Box 21692, Kitwe, Zambia Email: phennym@yahoo.co.uk Cell: +260969156065</p>	<p>Eng. Davy Banda, Former Peri-urban Manager/Sanitation Engineer, Mulonga water and Sewerage Company, P.O. Box 11712, Chingola, Zambia. Email: bandadavy@mWSC.com.zm Cell: +260967362338/955670164</p>

Expert's Contact Information: email abiudbanda@gmail.com Phone: 0972 590297/0953364136

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and iam available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my rejection by ZEMA.

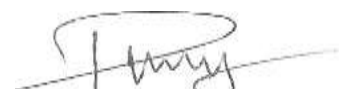
ABIUD BANDA



.....
 Name of Expert

Signature

PATSON ZULU



.....
 Name of authorized Representative of the Consultant

Signature

Alice Muyanga

Position Title and No.	ECOLOGY EXPERT
Name of Expert:	Alice Muyanga
Date of Birth:	28 th June, 1989
Country of Citizenship/Residence	Zambia

Education:

2011 to 2016 Copperbelt University, BSc Wood Science and Technology, ZAMBIA
 1995 to 2007 St Jones Convent Secondary School GCE Levels Certificate

Employment Record relevant to the Assignment:

Period	Employing Organization And Position. Contact Information	Country	Summary Of Activities Performed Relevant To The Assignment
November 2018 - present	Ecology Expert – Environmental Science and Engineering Consultants LTD	Zambia	<ul style="list-style-type: none"> • Reviewed previous works related to flora and fauna and relevant documents for a proposed Water Pipeline Project for Ramoji Resources in Salamano area CMLulushi District under Environmental Science and Engineering Consultant Limited • Ecological Expert for the proposed Molasses based ethanol plant By Consolidated Farming Limited in Shibuyunji District under Environmental Science and Engineering Consultant Limited • Assessed the flora of the area for the proposed mineral exploration project in Chondwe area Masaiti District by Zambia Weiye Limited, August 2019
2018	Supervisor – ZAFFICO, Ndola	Zambia	<ul style="list-style-type: none"> • Supervising casual workers in the maintenance of compartments, where small pine trees are grown
April 2017 – May 2017	Waste Management Researcher-Food and Agriculture Organisation	Zambia	<ul style="list-style-type: none"> • Interviewed the city council, households and the waste management bodies concerning the management of waste and how much was generate.

Membership in Professional Associations and Publication:

1. Member of CBU Anti-AIDS

Language Proficiency: Fluent in English, Bemba, and Nyanja

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capabilities to handle the assigned work
1. Document Reviews including ecological state of the proposed site and existing legal frameworks relevant to the projects	1. Reviewed previous works related to flora and fauna and relevant documents for a proposed Water Pipeline Project for Ramoji Resources in Salamano area CMLulushi District under Environmental Science and Engineering Consultant Limited.
2. Part of the team preparing the EIA terms of Reference for submission to ZEMA	2. Ecological Expert for the proposed Molasses based ethanol plant By Consolidated Farming Limited in Shibuyunji District under Environmental Science and Engineering Consultant Limited.
3. Part of the Scoping meeting to be held at the Proposed Project site	3. Ecological Expert for various other environmental impact assessment projects highlighted on the ESEC LTD Company experience.
4. Flora and fauna assessment of the proposed project site and compilation of the ecology report	4. Assessed the flora of the area for the proposed mineral exploration project in Chondwe area Masaiti District by Zambia Weiye Limited, August 2019

References

<p>Patson Zulu (0967470849) Environmental Science & Engineering Consultants Limited 10 Jacaranda Road, Town Centre Ndola</p>	<p>Prof. Jacob Mwitwa Lecturer at the Copperbelt University (Director at Kapasa Makasa University) School of Natural Resources Jambo Drive, Riverside Kitwe, Zambia. P.O. Box 21692 Tel. +260 212 230 923 Mobile: +260 977 848 462/ +260 966 848 462 EMAIL: mwitwajp@yahoo.com</p>
<p>Dr. Elisha Ncube Lecturer at the Copperbelt University School of Natural Resources Jambo Drive, Riverside Kitwe, Zambia. P.O. Box 21692 Tel. +260964612068/ +260977662278</p>	<p>Mrs Yaki Namiluko Lecturer at the Copperbelt University School of Mines and Minerals Jambo Drive, Riverside Kitwe, Zambia. P.O. Box 21692 Tel. +260977830770</p>

Expert's Contact Information: email muyanga.alice.am@gmail.com Phone: 0968327998

Certification:

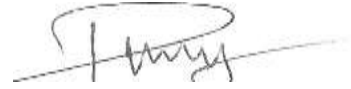
I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and iam available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my rejection by ZEMA.



.....
Name of Expert

Signature

PATSON ZULU



.....
Name of authorized Representative of the Consultant

Signature

Siame Ndanji

Position Title and No.	GEOLOGIST
Name of Expert:	Siame Ndanji
Date of Birth:	
Country of Citizenship/Residence	Zambia

Education:

2011 – 2017: University of Zambia – Bachelor of Mineral Science (Geology)

2007 – 2009: Zimba High School – Grade 12 School Certificate

2005 – 2006: Kafue Boys Secondary School – Grade 9 School Certificate

Employment Record relevant to the Assignment:

Period	Employing Organization And Position. Contact Information	Country	Summary Of Activities Performed Relevant To The Assignment
August 2019 - present	Geology Expert – Environmental Science and Engineering Consultants LTD	Zambia	<ul style="list-style-type: none"> Assessed the geology and possibility of successful exploration activities of the area for the proposed mineral exploration project in Chondwe area Masaiti District by Zambia Weiye Limited, August 2019
May to July of 2019	Survey Team Member - Geological Survey Department Geologist, Geological Survey of Zambia Ministry of Mines and Minerals Development Lusaka-10101, Zambia Tel: (+260) 0977563106, (+260) 0956723322	Zambia	<ul style="list-style-type: none"> Stream and soil sediment geochemical survey of the Copperbelt and Northwestern province conducted by the geological survey department from May to July of 2019. In this survey I took part in the planning of the survey and collection of the samples
2017 - July 2019	Geology Researcher – University of Zambia	Zambia	<ul style="list-style-type: none"> Conducted two projects that helped me in understanding the practical aspects of my field. The first was an independent mapping project, in this project I conducted geological mapping on an area of 20 km² from which I was able to generate a detailed geological map. The second project was a soil geochemical; survey, in this project soil samples collected in an area were analysed with the objective of finding mineralization in the area from which they were collected.

Licences:

1. Blasting Licence (All mine operations)
2. Valid Silicosis
3. Valid medical certificate of fitness (KCM)

Membership in Professional Associations and Publication:

1. President – The Copperbelt Mines and Minerals Engineering Society (May 2017 – July 2018)
2. Student Counsellor – The Copperbelt University Student Counsellor (May 2017 – June 2018)
3. Committee Member – The Engineering Institute of Zambia – CBU Chapter (May 2017 – July 2018)
4. Registered Member of Engineering Institution of Zambia (EIZ)
5. Registered Member of Southern Africa Institute of Mining and Metallurgy (SAIMM)

Language Proficiency: Fluent in English, Bemba, and Nyanja

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant’s Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capabilities to handle the assigned work
5. Document Reviews including geological and hydrogeological state of the proposed site and existing legal frameworks relevant to the projects	5. Reviewed previous works related to geology and mining rights and relevant documents for a proposed Water Pipeline Project for Ramoji Resources in Salamano area CMLulushi District under Environmental Science and Engineering Consultant Limited.
6. Geological and mineral quality assessment of the proposed project site and compilation of the mineral and soil assessment report	6. Assessed the geology and possibility of successful exploration activities for the proposed mineral exploration project in Chondwe area Masaiti District by Zambia Weiye Limited, August 2019

References

<p>B.N. Upreti, Ph.D. Professor and Head, Department of Geology School of Mines University of Zambia Great East Road Campus, P.O. Box 32379, Lusaka-10101, Zambia Tel: (+260) 0966716572 (Cell) Email: bnupreti@gmail.com Former Head of Department of Geology, and Dean, Institute of Science and Technology Tribhuvan University, Kathmandu, Nepal.</p>	<p>Dr. A. Ahmed, Ph.D Lecturer, Department of Geology School of Mines University of Zambia Great East Road Campus, P.O. Box 32379, Lusaka-10101, Zambia. Tel: (+260) 0978289796 Email: aahmed@unza.zm</p>
<p>Mr. C. Mwansa, B.Sc Geologist, Geological Survey of Zambia Ministry of Mines and Minerals Development Corner of Nationalist and Government road, P.O Box 50135, Lusaka-10101, Zambia</p>	<p>Mr. B. Musonda, M.Sc. Lecturer, Lecturer, Department of Geology School of Mines University of Zambia Great East Road Campus, P.O. Box 32379, Lusaka-</p>

Tel: (+260) 0977563106, (+260) 0956723322

10101, Zambia.
Tel: (+260) 0978825283

Expert's Contact Information: sndanji@gmail.com

Phone: 0975750200

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and iam available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my rejection by ZEMA.

Ndanji Same

27/05/22

Same

.....
Name of Expert

Signature

PATSON ZULU

Same

.....
Name of authorized Representative of the Consultant

Signature

Ernest Mwape

Position Title and No.	SOCIAL ECONOMIC EXPERT
Name of Expert:	Ernest Mwape
Date of Birth:	27 th January, 1966
Country of Citizenship/Residence	Zambia

Education:

1991	to	1994	University Of Manitoba, (Production Economics)	Msc. Agricultural Economics, CANADA
1984	to	1988	University Of Zambia,	BA Economics/Statistics, ZAMBIA
1979	to	1983	Mpatamato Secondary School	GCE O'levels Certificate

Employment Record relevant to the Assignment:

Period	Employing Organization And Position. Contact Information	Country	Summary Of Activities Performed Relevant To The Assignment
August 2014 to August 2017	Director – Policy and Planning Division, Zambia Development Agency (ZDA)	Zambia	<ol style="list-style-type: none"> 1. Editing, finalizing and publishing eight Annual Reports that were outstanding statutory obligations to the National Assembly since the Agency was established in 2007; 2. Preparing and publishing the 2016-2020 ZDA Strategic Plan; writing the 2016-2020 Strategic Plan for Zambia Export Development Fund (ZEDEF); 3. Reviewing and redesigning the Agency's Monitoring & Evaluation system; 4. Compiling the Agency's Annual Work-Plans and Budgets; and designing the template for Operations Manual for all Divisions at the Agency. 5. coordinated and facilitated a number of capacity workshops for the Agency, in particular officers in the Policy and Planning Division
August 2007 to August 2014	Economic Governance Specialist, Governance Department at the Ministry of Justice	Zambia	<ol style="list-style-type: none"> 1. Provided secretariat services to the Africa Peer Review Mechanism (APRM) 2. Facilitating and coordinating activities undertaken by governance oversight institutions that promote accountability, 3. Transparency, anti-corruption and those that foster increased efficiency and effectiveness in the delivery of public goods and services 4. co-authored thematic reports on Economic Governance and Management, and Political & Democratic Governance in

			Zambia's first self-assessment report for the APRM in 2010
November 2006 to July 2007	Program Officer - Private Sector Development Reform Program (PSD – RP) domiciled at the Ministry of Commerce, Trade and Industry (MCTI)	Zambia	1. responsible for coordinating activities that were undertaken through the Trade Expansion Working Group that eventually resulted in review and revision of some policies and regulations governing the business environment
October 2004 to October 2006	Macroeconomics Advisor - Japanese International Cooperation Agency (JICA) in Lusaka, Zambia	Zambia	1. prepared advisory notes on various economic development initiatives that the Zambian Government was undertaking
September 2001 up to November 2004	Policy Component Manager of the USAID-funded Community-Based Natural Resources Management and Sustainable Agriculture (CONASA) project		1. Raise public awareness about the concept and benefits of Community-Based Natural Resources Management (CBNRM). 2. reviewed and analysed policies and legislation that govern the natural resources sector in Zambia
1999 to September 2001	Chief Economist for the Zambia Association of Chambers of Commerce and Industry (ZACCI)		1. Draft position papers that reflected the interests and concerns of the business community for consideration by the Zambian Government and cooperating partners. 2. made a lot of presentations to the Parliamentary Committee on Economic Affairs and Labour, such as the recommendations and proposals that were adopted and implemented by Government through the World Bank sponsored Enterprise Development Project (EDP) that increased participation of commercial banks and made them comfortable to submit their confidential information

Membership in Professional Associations and Publications:

1. Secretariat to the African Peer Review Mechanism (APRM); Ruling Justly component of the Millennium Challenge Account (MCA); the initial Legal and Judicial Reforms Committee; the Governance Sector Advisory Group (GSAG); and the Macroeconomics Sector Advisory Group.
2. In July 2006 I was elected the Vice President of Economics Association of Zambia (EAZ). I did a lot of work for the Association, such as: preparing presentations for the Parliamentary Committee on Economic Affairs and Labour; critiques of the annual national budgets; prepared comments on various Government initiatives, policies, and legislation; drafted project proposals; organized and moderated discussions on topical economic issues; etc.
3. I served as Chairperson of the DFID-funded Revenue Institutions of Zambia Enhanced Support (RIZES)/CSO project hosted by Economics Association of Zambia (EAZ) between 2004 and 2005.
4. I was involved in negotiations between EAZ and NIZA (a Netherlands-based NGO) to help raise awareness on NEPAD program of the Organization of African Union.
5. I was Vice-Chairman of the Socio-Economic Committee of the Poverty Monitoring and

Analysis (PMA) component of the World Bank funded Zambia Social Investment Fund (ZAMSIF) project.

6. Between 1999 and 2001, I served on the Technical Committee of the Directorate of Macro-Economic Policy Analysis (DMPA) project jointly implemented by the Ministry of Finance and Economic Development (MOFED, Zambia); the Africa Capacity Building Foundation (ACBF in Harare, Zimbabwe) and the United Nations Development Program (UNDP in Zambia).
7. Between 2000 and 2001, I served on the Macro-economics and Industry Working Groups that were preparing Zambia's Poverty Reduction Strategy Paper (PRSP) under the auspices of the World Bank's Poverty Reduction Growth Facility (PRGF). From 2001 to 2004, I continued to participate in the PRSP process and maintained active links through the Environment SAG in which I represented the CONASA project and Civil Society for Poverty Reduction (CSPR).
8. Between August 2000 and August 2001 I served as the National Focal Point for Zambia for the second Africa-Asia Business Forum (AABF II). The Government of Japan through UNDP funded AABF with the objective of promoting business linkages between Asian and African companies. I recruited six companies that took part in the process and concluded with the Forum in Pretoria, South Africa.

Language Proficiency: Fluent in English, Bemba, and Nyanja

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capabilities to handle the assigned work
1. Part of the team preparing the inception Report	1. For ten months up to 31st July 2007, I was a Program Officer in charge of the portfolio looking at economic institutions, policy and trade expansion at the Private Sector Development Reform Program (PSD – RP)
2. Input in preparing terms of Reference	2. Socio-economic Expert for the proposed Copper Processing Plant in Salamano Area of CMLulushi District conducted under Environmental Science and Engineering Consultant Limited.
3. Stakeholders and interested parties consultations 4. Socio-economic surveys; 5. Socio-Economic impact assessment Environmental and Social-economic Sustainability Assessment	3. Socio-economic Expert for various other environmental impact assessment projects highlighted on the ESEC LTD Company experience. 4. Under the Ministry of Agriculture & Water Development (MAWD) in February 1989 he worked as Economist/Statistician responsible for organizing and conducting the annual crop forecasting surveys, and production of the National Early Warning Monthly Food Security Bulletins. 5. After the restructuring of the Ministry, I was appointed as Principal Planner (Infrastructure) and served as Project Coordinator of the civil works component of the US\$10mn World-Bank funded project called Zambia Agricultural, Marketing, Processing and Infrastructure Project (ZAMPIP)

6. Reviewing of draft EIS document	6. Internal Document Quality Control - reviewed the proposed Copper Processing Plant in Salamano Area of CMLulushi District conducted in 2018 under Environmental Science and Engineering Consultant Limited.
------------------------------------	---

Expert's Contact Information: email: ernmade@yahoo.co.uk Phone: 0967994059/0955994059

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and iam available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by ZPPA.

ERNEST MWAKE



Name of Expert

PATSON ZULU

Signature



Name of authorized Representative of the Consultant

Signature

Bwalya L. Mwale

Position Title and No.	ENVIRONMENTAL ENGINEER
Name of Expert:	Bwalya L. Mwale
Date of Birth:	28th February, 1995
Country of Citizenship/Residence	Zambia

Education:

Bachelor's Degree in Environmental Engineering, Copperbelt University (2013 – 2018), Kitwe, Zambia.
 GSCE G12 Division one certificate, Mazabuka Girls Secondary School (2009 - 2011), Mazabuka, Zambia

Employment Record relevant to the Assignment:

Period	Employing Organization And Position. Contact Information	Country	Summary Of Activities Performed Relevant To The Assignment
2019 to Present	Environmental Specialist - Environmental Science & Engineering Consultants Limited 10 Jacaranda Road, Town Centre, NDOLA	Zambia	Environmental Consultant - Environmental impact Assessment for the Construction of the China aided International Conference center in Lusaka by Ministry of Housing and Infrastructure Development(MHID), 2019 Environmental Consultant – Feasibility study for improved solid waste management system in Choma District by Choma municipal council and GIZ,2019 Environmental Consultant - Environmental impact Assessment for the Existing Copper oil processing plant in Lusaka by Parrogate Ginneries LTD,2020
2016	Environmental Engineer (Officer), Zambia Sugar Plc	Zambia	Ensured proper solid waste, surface and ground water management Carried out microbiological, water and waste water analysis Carried out air pollution analysis using stack emission analysis and trend studies Ensured all needed permits and clearances were obtained and all job cards worked on time Ensured safety, health, environment and quality management(SHEQ) were upheld Ground water pollution spatial distribution in njomona and kawama compound

Membership in Professional Associations and Publications:

1. Graduate Member- Engineering Institution of Zambia (MEIZ)
2. Journal of Environment Protection and Sustainable Department: Seasonal variation of nitrate and phosphate levels in groundwater-a case study of Mpongwe farming block in Zambia, 2019.
<http://files.aiscience.org/journal/article/pdf/70140070.pdf>
3. Project: Seasonal variation of nitrate and phosphate levels in groundwater-a case study of Mpongwe farming block, Copperbelt University 2018 to Department of Environmental lecturers, Kitwe

Language Proficiency: Fluent in English, Bemba, and Nyanja

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capabilities to handle the assigned work
1. Document Reviews including existing legal frameworks relevant to the projects	1. Review of relevant documents for a feasibility study for an improved solid waste management system in Choma District under Environmental Science and Engineering Consultant Limited.
2. Part of the Scoping meeting to be held at the Proposed Project site	2. Environmental Expert for various other environmental impact assessment projects highlighted on the ESEC LTD Company experience.
3. Collection of satellites maps for the existing waste collection containers	3. Data captured for current locations for stationary solid waste collections points and proposed Material recovery facility in Choma District under Environmental Science and Engineering Consultant Limited

References

<p>Patson Zulu (0967470849) Chairman and CEO Environmental Science & Engineering Consultants Limited 10 Jacaranda Road, Town Centre Ndola</p>	<p>Shirley Ndalama, Environmental Officer - Mazabuka, Zambia Sugar Plc P.O. Box 670240, Mazabuka. Tel: +260 963 317 222</p>
<p>Mr. S Sichilima, Project Supervisor/Lecturer, The Copperbelt University, School of Mines & Mineral Sciences, P.O. Box 21692, Kitwe, Zambia Email: nsichilima@gmail.com Tel: +260 964 825 396</p>	<p>Inonge P. Mulemi, SHERQ Officer - Mazabuka, Zambia Sugar Plc P.O. Box 670240, Mazabuka. Email: Inongemulemi@gmail.com Tel: +260 962 242 752</p>

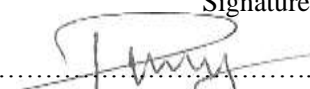
Expert's Contact Information: email bwalyalydiamwale95@gmail.com Tel: +260 953 029495/+260 977 782858



Name of Expert

PATSON ZULU

Signature



Name of authorized Representative of the Consultant

Signature

Pride Kalale Katele

Position Title and No.	MINING EXPERT
Name of Expert:	Pride Kalale Katele
Date of Birth:	5th October, 1992
Country of Citizenship/Residence	Zambia

PERSONAL DETAILS

Date of Birth : 05th October 1992
 Marital Status: Single
 Nationality : Zambian

OBJECTIVE

As a Mine Engineer graduate, I am seeking a role which allows me to continue learning and perfecting my skills as I provide high quality work and encourage me to flourish. I am capable of working with minimum Supervision and adapt to new concepts quickly while working under pressure.

EXPERIENCE

NFC African Mining

mine Production Controller- Shift Supervisor

1. Ensuring that the Opti Mine system is operating safely and effectively in order to optimize Production
2. Preparing all the activities/task according to plan
3. Monitoring the progress of the scheduled tasks
 1. Ensuring that correct tasks are started
 2. Ensuring that operators are updating the tasks correctly and timely
4. Generating and preparing the monitoring reports to all the relevant stakeholders
 1. Productivity reports
 2. Utilization reports
 3. Alerts reports
 4. Signals reports
5. Coordinating all the daily development, production and maintenance activities
 - . Monitoring and managing all the OptiMine system components in the Control Room as well as Underground
7. Ensuring that the tablets and ENFI cell phones are operational
 - . Ensuring that there is communication between the control room and the underground workings

9. Promoting and support the SEOB vision for safe , efficient and cost effective mining and offering solutions and innovative ideas for improvement

Karlsons (Consulting Engineers and Project Manager)

Mine Engineer

1. Designing and Planning mining layouts for Kinsenda mine DR Congo (Underground) using AutoCAD
2. Determining the type of Rock support to be used and mine calculations using Rocscience unwedge 2D
3. Drawing mining, civil and mechanical layouts for Kinsenda mine DR Congo
 1. Piping design
 2. Service Raise design
 3. Ladder way design
 4. Design of sumps and settlers

Environmental Science & Engineering Consultants (ESEC)

Mine Engineer

1. Preparing an environmental emergency preparedness and response plan.
2. Preparing an environmental impact Assessment for changfa and Messer Status Exploration minerals in Mkushi
3. Preparing monthly and quarterly reports for Changfa Resources Limited and submitting them to Mine Safety
4. To formulate work plans, which shall be carried out with the consent of the General Manager of Changfa Resources Limited
5. Providing mine related consultation services for Changfa Resources Limited.

6. Providing consultation and emergency handling services for Changfa Resources Limited and all kinds of events related to Mokambo Mine

CMC-Konkola Copper Mine (KCM)

Mining Engineer (Trainee)

1. Determining the life span for the rock tool
2. Determining the meters drilled before rock tools are disposed off
3. Counter checking the issued tools from bits, drill rods, coupling and Shanks
4. Controlling the consumption of rock tools per machine

Maamba Collieries Limited

Mining Engineer (Internship)

1. Completed and understood Supervisory course in Health Safety and environment (HSE) management.
2. Understood the personal protective equipment required for the use on the blasting crew and drill operations.
3. Understood the procedure for arming a blasthole with a detonator and booster.
4. Understood the correct procedure for loading bulk explosives into a blasthole
5. Understood and demonstrated the correct procedure for stemming a blasthole
6. Read and understood the blast design used by Maamba Collieries Ltd.

7. Knowledgeable about key equipment used in the pit.
8. Final year project (titled: truck dispatch system for Maamba Collieries Limited)

EDUCATION

20

13- 2018 The Copperbelt University-Bachelor's of engineering in mining engineering

2009- 2011 Mungwi Technical Secondary School-Grade 12 Certificate

2007-2008 Chiwanda Basic School-Grade 9 Certificate

2000-2006 Showers of Blessings Private school-Grade 7 Certificate

SKILLS

- AutoCAD Software
- Roscience Unwedge Software 2D
- Familiar with Surpac Software
- Microsoft office package
- Writing
- Team player
- Quick learner
- Innovative
- Communication skills

PROJECTS

- Dewatering System for Kinsenda mine DR Congo
 - Developing 435mL where the pump chamber will be
 - Developing of 430mL where Settlers and Sumps will be located and the shaft Raise that will connect to 285mL
 - Horizontal Sumps for Kcm
 - Designing of the layout of mining drawing for the sumps at 1150mL which includes the pump chamber and the substation Truck Dispatch System for Maamba Collieries Limited
 - Manual dispatch system is limited by ability of human dispatcher to keep/store and transfer large amount of information over long time space in very short processing timethat's why I introduced the use of modular dispatch software which does the following
1. Responsible for monitoring and recording truck location and status in and out of the pit.
 2. Makes necessary decisions without any by a human dispatcher
 3. Provides real time information which prevents unwanted delays or wrong production decisions and controls spend mechanism as you are able to monitor trucks and other equipment.

KNOWLEDGE

1. Knowledge of open pit mining methods
2. Knowledge of Mines and Minerals Act

3. Knowledge of Guide to mining Regulations
4. Knowledge of Explosive Regulations; and
5. Knowledge of Land and Environmental Regulations

INTERESTS

- Reading
- Public speaking
- Basketball
- Travelling

BEHAVIOUR TRAITS

- Upholding quality and high level of professionalism, honesty and integrity
- Thinking safety
- Good time management
- Well Disciplined
- Exceptional Interpersonal skills
- Co-operative and communicative
- High energy and enthusiasm and ability to work unsupervised
- Strong understanding of the mining industry and the issue that affect operational success

ACHIEVEMENTS & AWARDS

- President (CUMMES) The Copperbelt University mines and Minerals Engineering Society(May 2017-July 2018)
- Student Counsellor (CBU) The Copperbelt University Student Counsel (May 2017-June 2018)
- Committee Member (CBU) Engineering Institute of Zambia Copperbelt University Chapter(EIZ) May 2017-July 2018

ADDITIONAL INFORMATION

- Blasting Licence (All mining Operations)
- EIZ Certificate (Graduate Engineer)
- Valid Silicosis

REFERENCE

MR. CHAYO.B - "Maamba Collieries Limited"

Shift Supervisor-0977214368

Mr Patson Zulu - "Environmental Science and Engineering Consultants"

CEO-0967961831

Mr Mwanza - "Karlsons Consulting Engineers and project managers"

Project Manager-+260 97 6639072

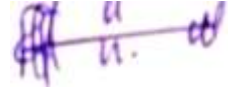
Mr Mungalaba - "The Copperbelt University"

Lecturer-+260 96 6431717

Expert's Contact Information: email pride.katele@yahoo.com Phone: 0975522916. 0956455966

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and iam available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my rejection by ZEMA.

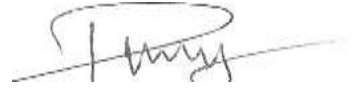


.....

Name of Expert

Signature

PATSON ZULU

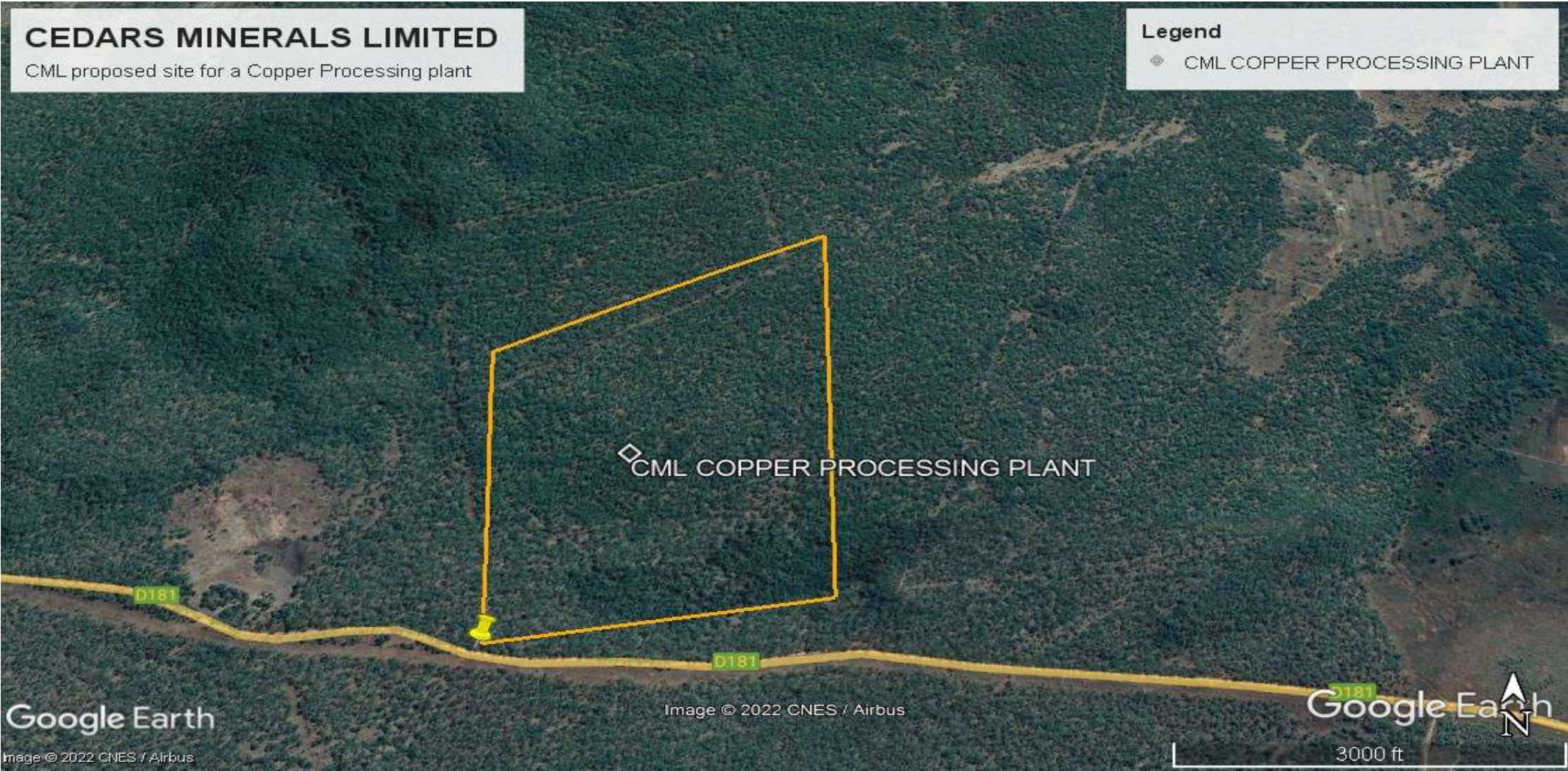


.....

Name of authorized Representative of the Consultant

Signature

APPENDIX A2: SATELLITE MAP OF THE PROPOSED COPPER PROCESSING PLANT



APPENDIX A3: PHOTOS OF THE PROPOSED EXPANSION SITE AREA



APPENDIX B: SCOPING ADVERT & MEETING REPORT

CEDARS MINERALS LIMITED

PUBLIC NOTICE

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) SCOPING MEETING FOR THE PROPOSED COPPER PROCESSING PLANT WITH A CAPACITY OF 300 TPD IN MUMBWA DISTRICT BY CEDARS MINERALS LIMITED.

The Environmental Management Act of 2011 requires that all companies engaged in processing operations undertake an Environmental Impact Assessment (EIA) to be approved by the Zambia Environmental Management Agency (ZEMA).

Cedars Minerals Limited intends to set up a Copper Processing Plant with a capacity of 300 tons per day (300TPD) in Mumbwa District.

This notice therefore serves to inform members of the general public, both interested and affected parties that an Environmental Impact Assessment for the aforementioned proposed project has **commenced**.

The Environmental Impact Assessment Regulations No.28 of 1997 requires that the sponsor of the project consult stakeholders through holding public meetings before operationalizing the project. The general public is hereby invited for the scoping meeting to be held at the proposed site located along Mumbwa – Kasempa Road, Farm 11383 Big Concession of Kitumba Area (about 45km to the Northwest of Mumbwa Township), meeting is to be held at 11:00am, on 17th June, 2022. It is further proposed that interested stakeholders can provide their comments and input in writing through the following platforms;

- Email: Cedarsmineralsltd@gmail.com

The deadline for submission of comments is 17th June, 2022.

R42/01/7.8.9.10

Copper Processing Plant - Mumbwa

ATTENDANCE LIST FOR SCOPING MEETING HELD AT SITE IN CHIEF KAINDU'S AREA OF MUMBWA DISTRICT FOR CEDARS MINERALS LIMITED ON 17th JUNE 2022

#	NAME	INSTITUTION/PLACE	AREA	NRC	CONTACT	SIGNATURE
1	BANDA MATTHEW	IMZ	KITUMBWA	544273/11/1	096870021	
2	MUNINGA CHEWCHA	IMZ	KITUMBWA	251118/76/1	0979282487	
3	TEMBO JEFFREY	SUGARLOAF FARM		1694497/01	0977506400	
4	CYNTHIA KAWU	SUGARLOAF FARM		1694497/21	0977306400	
5	IBRAHIM J. MUMBA	CONSTITUTIONAL LAWYER		113878/40/1	0978202130	
6	CHANDA PETER	ZNS	KITUMBWA	325076/12/1	0922046780	
7	COSMAS MILINDI					
8	ALFANAN SIMKALA	SITE WORKER	KITUMBWA	150632/4/1	0977553832	
9	JOHN KAYOLA		KITUMBWA		0796223003	
10	SVALUMWA WEBSTER		KITUMBWA	278227/5/1	0976501494	
11	MUMUNDA TONY	Site Carpenter	KITUMBWA		0972571162	
12	KENYEDY KASHATAKE	Site Carpenter	KITUMBWA	221862/8/1	0978311001	
13	JOHN CHANDA	Site Carpenter	Kitumbwa		079651225	
14	SIBANGANI MANGOMA	D/BLACK	D/BLACK	136541/12/1	0976310545	
15	REBECCA SIMONDA	SCHOOL CAMP		216981/15/1	0977648993	
16	KUREZO MURINDI	SCHOOL CAMP				
17	DAVID KUMUNDA	Mushaka Farm	P. RD	314035/82/1	0976242446	
18	PATROL ZULU	ESAC - CPA	LUSAKA		0161-470877	
19	ERNEST MWALE	ESAC - Soc-Plane	LUSAKA	194419/68/1	096797455	
20	MANJONI OBEJ	ESAC	LUSAKA		0977-808724	
21	PRINCE MUMUNDA	ESAC	KITUMBWA			
22						

matthbanda@gmail.com
 jeff.tembo@gmail.com
 ibrahimj@mumba.com

Copper Processing Plant - Mumbwa

ATTENDANCE LIST FOR SCOPING MEETING HELD AT SITE IN CHIEF KAINDU'S AREA OF MUMBWA DISTRICT FOR CEDARS MINERALS LIMITED ON 17th JUNE 2022

#	NAME	INSTITUTION/PLACE	AREA	NRC	CONTACT	SIGNATURE
1	LANSONI SANGWAPO	COUNCILOR	KALWASTEMBE	242206/66/1	0955486555	<i>[Signature]</i>
2	HEBO MULWA	KDC CHAIRPERSON	KALWASTEMBE	20320/5/1	0944887192	<i>[Signature]</i>
3	Ernest Mwangi	Y.D.C T/draperson	Kalwastembe	199408/7/11	0710867133	<i>[Signature]</i>
4	Mumbwa Julius	Mumbwa Town Council	Mumbwa	53026/6/11	0975712657	<i>[Signature]</i>
5	Richard Paul	MUSICIANS	MUMBWA	705510/13/2	5965434511	<i>[Signature]</i>
6	ENDOCK Chibukutu	farmer	MUMBWA	178710/13/11	0974924711	<i>[Signature]</i>
7	AVEPAGE Hachuma	farmer	MUMBWA	313863/7/11	0973298331	<i>[Signature]</i>
8	ESAU NCUBE	Farmer	CHITUMBA	2614109/12/11	097543664	<i>[Signature]</i>
9	Fredrick Chinganda	Farmer	Chitumba	157698/9/11	097283287	<i>[Signature]</i>
10	JBED MWAJANI	ESSEC	Levanta	184253/143/11	0977808724	<i>[Signature]</i>
11	KELISSA O O Spw	Farmer	Kitumba	256246/17/11	0975153362	<i>[Signature]</i>
12	Patrick Katunga	farmer	Chitumba	181222/7/11	0972107920	<i>[Signature]</i>
13	Live Mwinga	Farmer	Chitumba		0970499555	<i>[Signature]</i>
14	Sitali bbonifo	Farmer	Chitumba	522483/88/11	0978882757	<i>[Signature]</i>
15	Sindaka Sindaka	Farmer	Chitumba			<i>[Signature]</i>
16	KASONDE CHIROPE	OFFICER	MUMBWA	344969/48/11	0972671811	<i>[Signature]</i>
17	Emmanuel Tanga			241267/1/11	0973655670	<i>[Signature]</i>
18	Lawrence	Chitumba	Chitumba	76767/9/11	0971122345	<i>[Signature]</i>
19	JAPHET SINDAYA	SITE MANAGER	CHITUMBA	150741/9/11	0970497009	<i>[Signature]</i>
20						
21						
22						

Copper Processing Plant - Mumbwa

ATTENDANCE LIST FOR SCOPING MEETING HELD AT SITE IN CHIEF KAINDU'S AREA OF MUMBWA DISTRICT FOR CEDARS MINERALS LIMITED ON 17th JUNE 2022

#	NAME	INSTITUTION/PLACE	AREA	NRC	CONTACT	SIGNATURE
1	MARK KACHINDA	MUMBWA	Kalukama	979956/11	0971 435221	[Signature]
2	Golden Robertson	Community member	Chitopepe	064963/11		
3	SIMON MSONDU	"	Chitopepe			S MSONDU
4	VICTOR MAMBELO	"	Chitopepe			V MAMBELO
5	MUNISA CURRENT	"	Chitopepe	268636/11		C MUNISA
6	MUSEMBA HAKALIKI	D/BLOCK comm mem	KITUMBA	105183/11	0972599159	[Signature]
7	SYAKALIMA BIRD	D/BLOCK comm mem	KITUMBA			B SYAKALIMA
8	OCCP					
9	OBIGUS	HILSONFO				
10	MOTCA	MSOTANI		176225/11		
11	Colleen H... ..	Ribuluka		178789/11	0976312261	
12	RIPES HAMBIA	FARMER	MUMBWA	278552/11	0975460411	-RHAMBIA
13	Kennedy Mumbwa	D/Block	Mumbwa		0976550223	K Mumbwa
14	Jamot S. Lunga	Muzungu Log Farm	Mumbwa	181207/11		J S Lunga
15						
16						
17						
18						
19						
20						
21						
22						

RECORD OF CONSULTATIONS DURING SCOPING PHASE OF THE EIA FOR PROPOSED MINERALS PROCESSING PLANT TO BE LOCATED IN KITUMBA OF CHIEF KAINDU'S AREA OF MUMBWA DISTRICT, 17th JUNE 2022

Cedars Minerals Zambia Limited proposes to construct a mineral processing plant in Kitumba of Chief Kaindu's kingdom located in Mumbwa district. Before construction of the plant can start the Zambian law requires that the company undertake an environmental impact assessment (EIA) under supervision of Zambia Environment Management Agency (ZEMA). The first step requires holding a public meeting at which members of the general public are informed about the proposed project.

Following the invitation conveyed through the advertisements placed in the press and physical in-person contact of key stakeholders in the area, the Scoping meeting for the proposed copper processing plant was held on 17th June 2022 at site of Cedars Minerals Limited, the proponents of the project.

The meeting was called to order at 11:40 hrs by Mr Patson Zulu, the Chairperson and CEO of Environmental Science and Engineering Consultants (ESEC) Limited company. He apologised for arriving late for the meeting due to underestimating the extent of the bad state of the road from Mumbwa to the site. Mr Mwiinga offered to translate the proceedings from English to Tonga, and vice versa.

Having recognised the presence of His Royal Highness Chief Kaindu and other invited key stakeholders, Mr Zulu observed all protocols for a formal meeting to begin. He talked about the purpose of the meeting (initial consultation of key stakeholders in readiness for preparation of the ToRs for preparation of the EIA for the proposed copper processing plant. He informed the meeting that Cedars Minerals engaged ESEC to undertake the environmental impact assessment (EIA) of the proposed project as per the requirement of Zambia's environmental law.

At this juncture, Mr Zulu asked for a volunteer to offer opening prayer for the success of the meeting. After the Chief's retainer prayed, all present were asked to introduce themselves, starting with company management. (see attached attendance list)

Mr Zulu started his presentation by discussing the legal requirements before executing a proposed investment project, one which is preparation of an Environment Impact Assessment (EIA). Proponents of investment projects engage consultants to undertake EIA on their behalf under

guidance by the Zambia Environmental Management Agency (ZEMA) that reviews and approves every step to be followed. Some of the issues covered in the present were:

- Budget for project is USD 3.5 million
- Plant will process 300 Mt of copper ore to extract 10 Mt of concentrate per day
- Source of electricity is ZESCO mains
- Copper ore will be sourced from MineTech mine, located some 2 Km from Cedar Mineral Processing plant
- Water for processing will be drawn from a borehole to be sunk within the plant site
- Lifespan of the plant is 25 years
- 70 Zambians with employed on permanent basis, with one foreigner
- Benefits include jobs for local community members, increased foreign exchange for the country, additional source of government tax revenue, increased business opportunities and secondary jobs for local community
- Likely Negative environment impacts: land degradation, air and water pollution, increased income for casual workers may result in increased social delinquency and diseases,
- Likely positive impacts: improved aesthetics and value of surrounding area, additional infrastructure will result in increased capital stock of the area, additional social economic infrastructure through company's corporate social responsibility activities.

Mr Zulu discussed the stages of the EIA process in Zambia, and tentative schedule of activities/tasks that will be performed by ESEC and indicative response timelines from ZEMA. A summary of the activities was:

- Scoping meeting was held at site on 17th June 2022. These minutes are evidence of that activity having taken place.
- Terms of Reference (ToRs) and Scoping report prepared by ESEC and submitted to ZEMA for consideration and approval in June 2022
- Impact assessment studies undertaken by ESEC in June/July
- Disclosure of EIA findings meeting in July 2022
- ZEMA may hold its own public meeting in August/September 2022
- ESEC prepares the final the Environmental Impact Statement (EIS) after taking into account comments from disclosure meeting and ZEMA input.

- If approved, Cedars minerals can mobilise and start construction works in Sept/October 2022

PLENARY SESSION

After the presentation, Mr Zulu invited participants to raise any preliminary concerns and questions about the proposed mineral processing plant and EIA process in Zambia. The following issues were raised and discussed as per this record.

- i. His Royal Highness (HRH) Chief Kaindu was concerned about the time it will take ZEMA to issue the final approval/permit.
- ii. Mr Tembo of Sugarloaf was not clear about the source and amount of groundwater to be abstracted, given the local community in the area are mostly farmers. He was also worried about the state of the road given the amount of ore that will be moved on the roads, estimated at 10 or more trucks per day each carrying 25 or 30 Mt of ore.

In response, Cedar Minerals Ltd indicated that the source of ore (MineTech Mines) is 2 km from the processing plant, and therefore only a small amount of copper concentrate will be moved for longer distance. The rest of the material will remain at dumpsite, from which copper oxide will be extracted and sold to other companies that use it as raw material.

It was also indicated that MineTech is a small-scale mine that does not require a full EIA, but an Environmental Project Brief (EPB) which has already been prepared and approved by ZEMA. MineTech was issued the mining license in 2021.

Cedars informed the meeting that the initial proposed site for the processing plant was 46 Km east of MineTech mine that is located in Kitumba of Chief Kaindu's area of Mumbwa district. The company felt it was both environmentally and economically sound to locate the processing plant near the source of ore, thus the current site that is only 2 Km from MineTech mine. Cedars promised to rehabilitate that portion of the road on which the ore will be transported.

The meeting was also informed that unfortunately the rock that remains after extracting the copper is not suitable for road construction because it easily disintegrates after rainwater falls on it.

- iii. Richard wanted to know what process was going to be used to extract copper. Cedars Minerals indicated that it will use floaters to extract the copper sulphate. The copper oxide will be extracted from the tailings dump and sold to other companies.

- iv. Mr Mweemba wanted assurance by the company to rehabilitate the ditches dug by illegal miners; deal with anticipated air pollution that the school will be subjected to, and company CSR plan.

Cedars Minerals indicated that it will take care of the ditches within the licensed area, rehabilitate the area for the safety of its workers and surrounding community.

Waste-water from processing will be channelled and stored in designated drainage pits. The company has already donated some roofing materials to the school and promised to donate more stuff in future.

- v. The Counsellor for Kitumba wanted to know where the dump site will be located while emphasising the importance of having a durable motorable Mumbwa-Kasempa road.

Cedars Minerals indicated that the processing plant will cover only one hectare of land, and one acre will be used as a dumpsite. Therefore everything will be done within 2 hectares of land. The company was just as concerned about the state of the road as other stakeholders, and hoped that other businesses in the area will contribute resources towards rehabilitating and maintaining a better road. Cedars offered its earth-moving equipment for road rehabilitation and construction purposes.

- vi. Mr Banda from a nearby copper mine wanted to know how much water will be abstracted from underground, and what will happen to the sulphur that will not be extracted.

Cedars Minerals indicated that it will fill up the tank only once, thereafter it will only top up to replenish as and when need arises. The technology will not use too much water in the processing of the ore.

The tailings dump will contain about 2 percent copper oxide and copper sulphate that can be recovered and sold.

- vii. The Chief's retainer/headman welcomed the good intentions of Cedar Minerals Ltd, but urged the company to genuinely help the local community. He said there have been similar pledges by business people before but did not amount to anything in the end. The local community needs a lot of help to improve their social-economic situation.
- viii. The environmental officer from Mumbwa district suggested that the company should also be considerate of the workers' welfare in terms of better conditions of service. He hoped that the company will provide resources for a

clinic and ambulance for use by the workers and their immediate families.

In response, Cedars Minerals Ltd pledged to abide by all the Zambian labour laws – just as it was doing in other projects around the country. The ZDA license indicates that 70 employees will be engaged on a permanent basis, and will require only one expatriate staff member. The company is aware of the poor standard of living among members of the local community, and will contribute to improve the same.

- ix. Mr Mwiinga the translator wondered what would happen to the environment at the site after preliminary mineral exploration activities in case ZEMA rejected the proposal.

ESEC responded that investors are given enough time and opportunity to address any concerns that stakeholders like ZEMA, local community and other businesses may have.

The headman spoke on behalf of the Chief to close the meeting. He said that the local community welcomes the proposed mineral processing project in Kitumba. He thanked Cedars Minerals Limited for consulting the local community members, unlike other businesses that did not do the same. He informed the meeting that the local community was appreciative of the help the company has rendered to the school so far, and looked forward to seeing more help in the area of roads, clinic (given the high number of workers), transport for workers who may fall sick.

The meeting ended at 13:40 hrs.

Report prepared by



Ernest Mwape

Socio-Economic Specialist, ESEC

17th June 2022



APPENDIX C: DISCLOSURE ADVERT & MEETING REPORT

CEDARS MINERALS LIMITED
PUBLIC NOTICE

**ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
DISCLOSURE MEETING FOR THE PROPOSED
COPPER PROCESSING PLANT WITH A CAPACITY OF
300 TONS PER DAY IN MUMBWA DISTRICT BY
CEDARS MINERALS LIMITED.**

The Environmental Management Act of 2011 requires that all companies or facilities engaged in process operations undertake an Environmental Impact Assessment (EIA) to be approved by the Zambia Environmental Management Agency (ZEMA).

Cedars Minerals Limited intends to set up a Copper Processing Plant with a capacity of 300 tons per day (300TPD) in Mumbwa District.

This notice therefore serves to inform members of the general public, both interested and affected parties that an Environmental Impact Assessment for the aforementioned proposed project has been conducted and an opportunity is hereby being availed to the public to review the findings to the assessment.

The Environmental Impact Assessment Regulations No.28 of 1997 requires that the sponsor of the project to inform and consult stakeholders through holding of a public meeting before operationalizing the project. The general public is hereby invited to a disclosure meeting to be held at the proposed site located along Mumbwa-Kasempa Road Farm 11838 Big Concession of Kitumba area (about 45km Northwest of Mumbwa town) on Friday 28th September 2022 at 11:30 hours. Members of the public are further advised to provide their comments and input in written to us through the following platform;

- Email: CedarsmineralsLtd@gmail.com

The deadline for submission of comments is 28th September 2022.

MINUTES OF THE PUBLIC DISCLOSURE MEETING FOR THE PROPOSED MINERAL PROCESSING PLANT TO BE LOCATED IN KITUMBA, CHIEF KAINDU'S AREA OF MUMBWA DISTRICT,

(17th SEPTEMBER 2022)

Cedars Minerals Zambia Limited proposes to construct a mineral processing plant in Kitumba of Chief Kaindu's area of Mumbwa district. A Scoping meeting was held on 17th June 2022 where Environmental Science and Engineering Consultants (ESEC) Limited briefed stakeholders about the proposed mineral processing plant and the legal requirements that the company should meet before proceeding to construction and operation of the plant, namely undertake environmental impact assessment. Upon approval of the Scoping Report and Terms of Reference for the EIA for the proposed mineral processing plant, ESEC conducted the specialist studies and called for a public meeting to disclose the findings.

The meeting was called to order at 12:00 hrs by Mr Patson Zulu, the Chairperson and CEO of ESEC. He acknowledged the presence of Chief Kaindu then asked all in attendance to introduce themselves. He informed the meeting that the purpose and objective of the second meeting was to share findings from the specialist studies that were undertaken according to the terms of reference that were approved by ZEMA.

He first highlighted key issues from the Scoping meeting that was held on 17th June 2022 for the benefit of the majority people who did not attend the first meeting. He reminded the meeting of the following key things about the proposed mineral processing plant:

- Budget for project is USD 3.5 million
- Plant will process 300 Mt of copper ore to extract 10 Mt of concentrate per day
- Source of electricity is ZESCO mains
- Copper ore will be sourced from MineTech mine, located some 2 Km from Cedar Mineral Processing plant
- Water for processing will be drawn from a borehole to be sunk within the plant site
- Lifespan of the plant is 25 years
- 70 Zambians will be employed on permanent basis, with three foreigners
- Benefits to Zambia include jobs for local community members, increased foreign exchange for the country, additional source of government tax revenue, increased business opportunities and secondary multiplier effect jobs for local community and beyond
- Likely Negative environment impacts: land degradation, air and water pollution, increased income for casual workers may result in increased social delinquency and diseases,
- Likely positive impacts: improved aesthetics and value of surrounding area, additional infrastructure will result in increased capital stock of the area, additional social economic infrastructure through company's corporate social responsibility activities.

FINDINGS FROM SPECIALIST STUDIES

Mr. Zulu indicated that the methodology in executing the EIA was two prolonged; namely physical inspection of site and take samples for laboratory tests, and review of relevant literature. The detailed technical aspects of the study are in the report, only the following key basic findings were shared with the people in attendance.

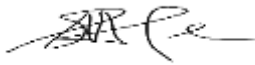
- Cedars Minerals acquired 94 ha of land, of which only 4 ha is devoted to the mineral processing plant. At the time of conducting studies only 120m X 120m or slightly over one hectare was cleared for preparatory works
- Three boreholes of which one was of industrial capacity and one had collapsed. There will be a water reservoir
- Type of vegetation in the area. It is anticipated that company activities will not damage the ecosystem integrity of the area
- No large wild animals nor any unique tree species
- No human settlement, therefore no relocation and compensation of loss of livelihoods of people
- Recommendations and measures to be undertaken to mitigate negative environmental and social impacts, such as
 - Rehabilitation and maintenance of roads in collaboration with neighbouring commercial entities
 - Handling of hazardous substances and other wastes as contained in the Environmental Management and Monitoring Plan (EMMP) that indicates roles and responsibilities of key stakeholders
 - Contractors to follow EMMP and other relevant Zambian laws on every aspect the business, such as permits and licenses, protection of the environment, labour, safety, etc and other international best practices such as the Equator Principles
 - Emergence preparedness and response plan should include the local stakeholders
 - Cedars promised to provide a provisional list of things that the company will provide for the benefit of the local community for inclusion in the final draft EIS – as part of its CSR
 - Decommissioning and closure

PLENARY SESSION

1. Mr. Abel Mushobo wanted to know whether there will be jobs for people without formal educational qualifications. Cedars management assured him that there will be manual labour and specialist jobs as well.
2. Mr. P. H. Mweemba wanted to know what will happen to the 90 ha that the company has not committed to plant operations. Management indicated that the remaining portion was left for future expansion, although most of that area is hilly only suitable for non-core activities
3. Cedars Minerals encouraged local participants to visit the plant site to make submissions on issues that maybe of mutual interest to both the community and the company.

In closing the deliberations, Mr Zulu indicated that ZEMA may convene another meeting to verify the consultant's findings and input from the local stakeholders. Thereafter the Chief retainer closed the meeting with a vote thanx. He said that people appreciated and valued investments made thus far. He however wanted the works to proceed at a faster speed so that people can be offered the much anticipated jobs.

There being no other business the meeting ended at 13:10 hrs, and lunch was served.



Ernest Mwape, Socio-Economist - ESEC

Secretary

Date: 28th September 2022

ATTENDANCE LIST FOR DISCLOSURE MEETING AT SITE IN CHIEF KAINDU'S AREA OF MUMBWA DISTRICT FOR CEDARS MINERALS LIMITED ON 28TH SEPTEMBER, 2022.

#	NAME	INSTITUTION/PLACE	AREA	NRC	CONTACT	SIGNATURE
1	Lisbon Mwapakabwata	Muncimwa		205653/15/1	0971226408	L Mwapakabwata
2	Oscar Hachoombe	muncimwa		189724/15/1 3537231701	0978330232	O Hachoombe
3	CHAILET MUSEEMBA	Muncimwa		197722	0972232054	Chailet Museemba
4	Samson Kachinda	muncimwa		227836/15/1	0957438394	Samson Kachinda
5	RIPINS CHIBALO	muncimwa		227126/16/1	0957623561	Ripins Chibalo
6	HITAM HAIWIIDI	Muncimwa		173985/15/1	0975606613	Hitam Haiwiidi
7	Collenji Harizonga	Mushungushi		178735/15/1	0763971261	Collenji Harizonga
8	Leonard Fuhole	D BLOCK		210234/12/11	0968596416	Leonard Fuhole
9	DAVIDUS HAMBILI	D. BLOCK				Davidus Hambili
10	maase Hankoko	Ka Shikanda		201980/72/1		Maase Hankoko
11	Robert Chilukutu	Kitipetipa		279218/15/1	0979569562	Robert Chilukutu
12	BOSTON CHILUKUTU	CHIT		192288/15/1	0974021122	Boston Chilukutu
13	Daniel Lungu N	D. BLOCK		314688/82/1	0978247446	Daniel Lungu N
14	NICKSON NDIUMBA	D. BLOCK		166169/72/1	0976095322	Nickson Ndiumba
15	IMONDA COLLINS	KITUMBA SCHOOL		275647/82/1	0978729932	Imonda Collins
16	SIAKALIMA BINA maanileza	KITUMBA SCHOOL		254364/16/1	0973780556	Siakalima Bina
17	Janet Longa	Kitumba		181207/16/1	0777911668	Janet Longa
18	Abigail Mwale	Kitumba		411464/10/1	0978312381	Abigail Mwale

Copper Processing Plant - Mumbwa

ATTENDANCE LIST FOR DISCLOSURE MEETING HELD AT SITE IN CHIEF KAINDU'S AREA OF MUMBWA DISTRICT FOR CEDARS MINERALS LIMITED ON 28TH SEPTEMBER, 2022.

#	NAME	INSTITUTION/PLACE	AREA	NRC	CONTACT	SIGNATURE
1	MR MWEMBA HAKALALI	KITUMBA SCH	KAINDU	105783/77/1	0972599159	
2	MWILINGA CHEWETA	INTREPO MINES		251118/76/1	0979283459	
3	FELIX FUMPA	INTREPO MINES		28857/15/1	0975087505	
4	ACKSON Mwenba	D. Bok		218796/74/1	0965548226	
5	MAKUMBE MATHIAS	D. Bok		336506/74/1	0976015373	
6	Emma tongg	Kitumba			0979085070	T. Fumpani
7	Jeff Tembo	Sugarbaf Farm	"	169407/71/1	0977806400	
8	Syababwira Webster	Kitumba sch		272252/15/1	097650496	
9	MR Robson Chibweedi	Kitumba sch	"	275360/17/1	097100922	
10	MR ESAU Ncube	Kitumba		244609/17/1	0975436614	
11	MR Abeol Musthoro	LEPSALANGA		204680/15/1	0760763746	
12	MR Muchimwa			195955/17/1	0974694629	Mushili
13	MR RIFORD HAMILA	CHITUMBA	"	213659/73/1	0765190041	
14						
15						
16						
17						
18						



APPENDIX D: CERTIFICATE OF INCORPORATION

Digitally signed by Peter Chewe CHILUFYA
Issued by issuer users.pki@gub.gov.zm
Reason: C.20220216-024398
Location: Patents and Companies Registra
Date: 2022-02-16 17:12:50 UTC+0

CF45
(Regulation 46)
Companies Registration No. 120220028346
Serial No. 1204489



1204489



Republic Of Zambia

The Companies Act, 2017

(Act No. 10 of 2017)

The Companies (Prescribed Forms) Regulations, 2018

(Section 14)

CERTIFICATE OF INCORPORATION PRIVATE COMPANY LIMITED BY SHARES

This is to certify that CEDARS MINERALS LIMITED is on and from the 16th day of February 2022 incorporated as a PRIVATE COMPANY LIMITED BY SHARES.

Given under my hand and seal at Lusaka, Zambia, this 16th day of February 2022.



Peter Chewe CHILUFYA
Deputy Registrar of Companies

CF47

(Regulation 48)

Companies Registration No. 120220028346

Serial No. 1204489



SCAN TO VIEW
SHARE REGISTRATION DETAILS



Republic Of Zambia

The Companies Act, 2017

(Act No: 10 of 2017)

The Companies (Prescribed Forms) Regulations, 2018

(Section 14)

CERTIFICATE OF SHARE CAPITAL

This is to certify that CEDARS MINERALS LIMITED has the nominal capital of **K15,000.00** divided into:

Number	Class	Value
15,000.00	Ordinary	1.00

Given under my hand and seal at Lusaka, Zambia, this **16th day of February 2022**.



Peter Chewe CHILUFYA
Deputy Registrar of Companies



Patents and Companies Registration Agency

Computer Printout - Local Company



Local Company	CEDARS MINERALS LIMITED	Registration Number	120220022346
Date of Incorporation	16 day of February 2022	Date of FY End	16/02/2023
Registered Office	PLOT NO. 10652, KASANDA AREA, KABWE, CENTRAL PROVINCE, ZAMBIA		
Postal Address	PLOT NO. 10652, KASANDA AREA, KABWE, CENTRAL PROVINCE, ZAMBIA		
Town / City	KASANDA AREA		
Country	ZAMBIA		
Certificate Signed By	Peter Chewe CHILUFYA		
Phone	+260978555552		
Email	hilalbourgi@hotmail.com		
Struck off/Ceased on			
Nominal capital	K 15000		
Liability	Ordinary Company		
Articles Filed Date			
Amended Articles Filed Date			
Adopted Articles Filed Date			
Company Liquidated Date			
Company in Receivership Date			
Date Of Pre-deregistration			
Date Of Initial Gazette Notice			
Winding Up Resolution Date			



* - Information in this report can change any time.
 Printed By: PACRA Printed On: 17/02/2022

Copper Processing Plant - Mumbwa

Business Entities

Individual Beneficial Owners

Beneficiary	Nationality	Identity Number	Beneficial Owner	Shareholder	Beneficial Ownership Nature	Amount	Share Class
HILAL BOURJI -	LEBANON	562425/99/3	Yes	HILAL BOURJI -	1	2,250.00	Ordinary
RONY I. CHAMOUN	LEBANON	LR2083670	Yes	RONY I. CHAMOUN	1	3,750.00	Ordinary
MICHEL M. FAHED	LEBANON	LR1766736	Yes	MICHEL M. FAHED	1	3,750.00	Ordinary
YUYE LIU -	CHINA	EG1751830	Yes	YUYE LIU -	1	3,750.00	Ordinary
ALAA BOURJI -	IVOIRIENNE	20AE67691	Yes	ALAA BOURJI	1	1,500.00	Ordinary

Artificial Beneficial Owners

Mortgagees



* - Information in this report can change any time.
Printed By: PACRA Printed On: 17/02/2022

APPENDIX E: CERTIFICATE OF TITLE



DR 1A



0066257

No.: 123204

Registered No.: 11383/4

THE LANDS AND DEEDS REGISTRY ACT
(Section 45)

No.:

CERTIFICATE OF TITLE

THIS Certificate, dated the.....**THIRTEENTH**.....day of.....**APRIL**.....two thousand and.....**TWENTY TWO**.....under the hand and seal of the Registrar of the Lands and Deeds Registry of Zambia WITNESSETH that.....**CEDARS MINERALS COMPANY LIMITED**..... a company incorporated in Zambia and having its registered Office at Lusaka.....

..... is a tenant or lessee for the unexpired residue of a term of.....**99**.....years from the.....**first**..... day of.....**March**....., 20..**21**.....(subject to such reservations, restrictions, incumbrances, liens, estates and interests as are notified by memorial underwritten or endorsed hereon) of and in ALL that

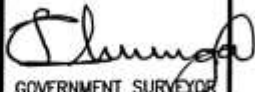
Piece of land in extent 93.9976 hectares more or less being Farm No.11383 situate in the Central Province of Zambia which piece of land is more particularly delineated and described on Diagram No.ED_11846 of 2015 except and reserved all minerals oils and precious stones whatsoever upon or under the said land.....

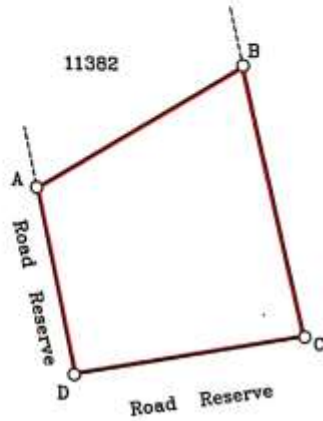

 Registrar
 

Memorials

Date of Document	Date of Registration	Registered No.	Description	Cancellation
29/03/2022	29/03/2022	11383/1	Subject to the exceptions reservations restrictions restrictive covenants and conditions mentioned contained or referred to in a lease (a copy of which is attached hereto) made between The President of The Republic of Zambia of the one part and SERAH CHILUFYA of the other part.	

PTO

SIDES METRES		ANGLES OF DIRECTION	SYSTEM E	CO-ORDINATES UTM 27 METRES	N	DIAGRAM NUMBER SD_11846/2015
AB	1010.00	59.01.45				APPROVED:  GOVERNMENT SURVEYOR DATE: 27/01/2015
BC	1150.07	166.50.53				
CD	987.79	260.10.51				
DA	783.96	348.38.39				



SCALE 1: 25000

BEACON DESCRIPTION All are iron pegs in concrete

THE FIGURE A - B - C - D - A

REPRESENTS 93.9978 Hectares

OF LAND BEING Farm 11383

SITUATED IN THE Central PROVINCE REPUBLIC OF ZAMBIA

SURVEYED IN September, 2013

BY ME

J. Minango
LAND SURVEYOR

PARENT DIAGRAM No.:
 SURVEY RECORDS No.: 1187/2015
 S G FILE No.: S/34/11374
 PLAN No.: 1187/2015
 MAP REFERENCE: 1426 D2

APPROVED IN TERMS OF SECTION 30
 OF THE LAND SURVEY ACT

APPENDIX F: CHANGE OF LAND USE

Stocked by Govt Printers
20m E37 9/79 P/F

Registered
Number of
Application

MODIFICATION NO.
MUM/076

THE URBAN AND REGIONAL PLANNING ACT
NOTIFICATION OF APPROVAL/REFUSAL OF PLANNING PERMISSION

To:

CEDARS MINERALS COMPANY LIMITED
Farm 11383, MUMBWA
LUSAKA

9th September 2022

Your application numbered as above, submitted onfor
Permission/permission **IN PRINCIPLE** to change land use from *Agriculture to Industrial (Mineral Processing Plant)*

Farm 11383 Mumbwa MUMBWA
OnSituated along.....Road in

APPROVED MINISTER OF LOCAL
Has been on the.....by the

GOVERNMENT AND RURAL DEVELOPMENT

.....subject to the following conditions:

- (i) Planning permission must be obtained from the relevant planning authority before commencement of construction works and extensions thereof.
- (ii) Any other condition that the Planning Authority may wish to impose.
- (iii) Ensure Proper Traffic Circulation and enhance on-site parking to avoid congestion.

c.c. Executive Secretary, Central Province Planning Authority, KABWE
c.c. The Council Secretary, Mumbwa Town Council, MUMBWA
c.c. The Commissioner of Lands, P. O. Box 30069, LUSAKA

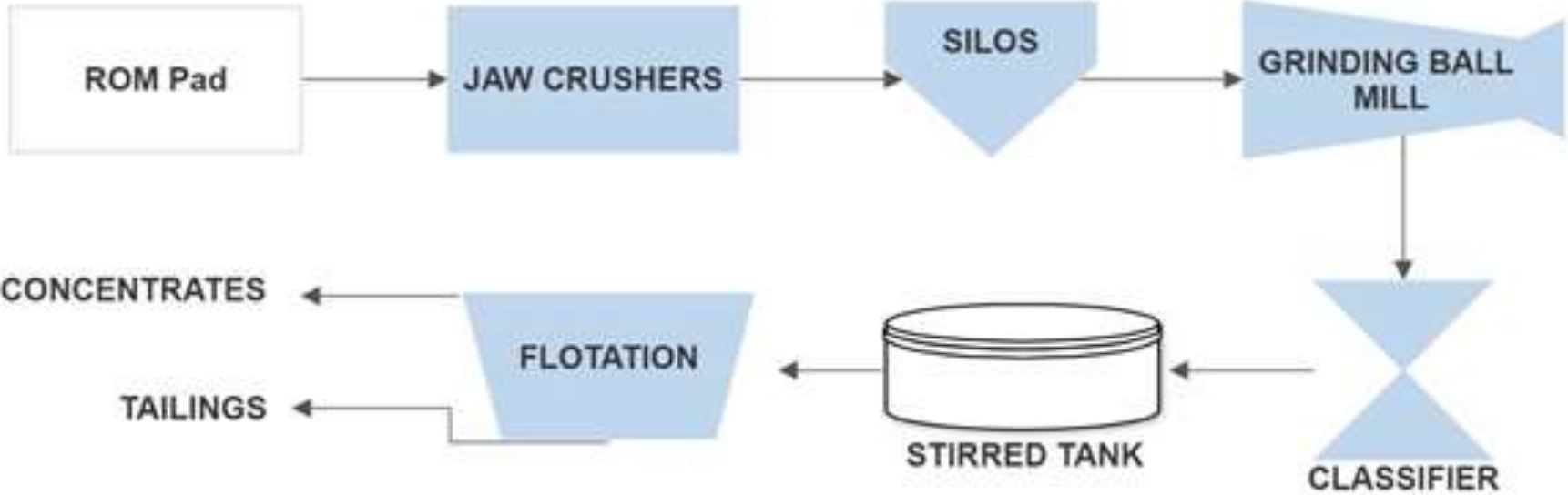
Date 09/09/22 Signed [Signature]
Minister of Local Government and Rural Development



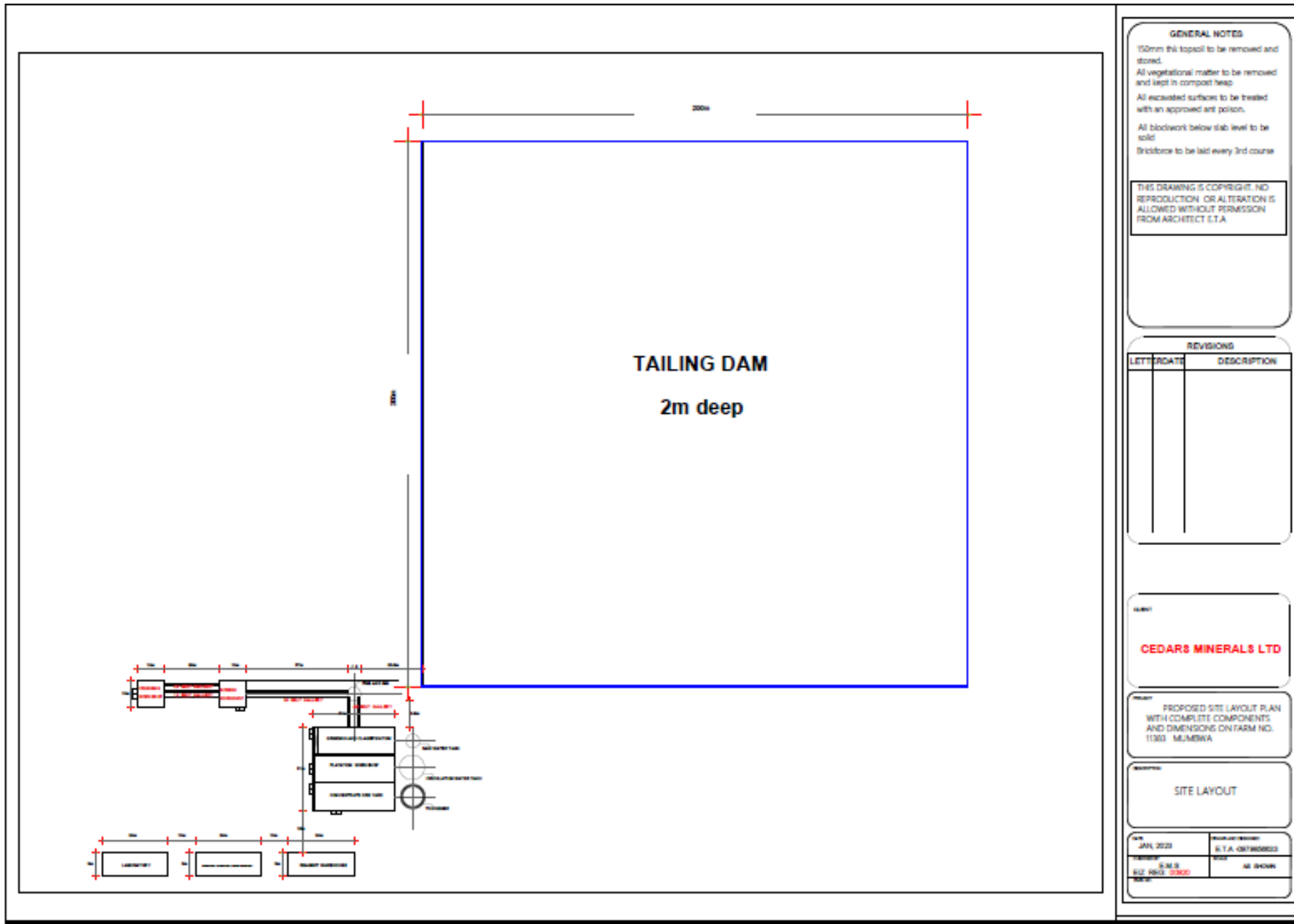
NOTES

1. In the case of subdivision approvals where the records of the sub-divisional survey required by section ten (i) and twenty-one of the Land Survey Act are not lodged with the Surveyor-General within the period stated in the approval, such approval shall be deemed to be cancelled.
2. If the applicant is aggrieved by the decision of the planning authority to refuse permission for the proposed development or subdivision or to grant permission subject to conditions, he may, by notice served within twenty-eight days of the receipt of this notification or such longer period as the Planning Appeals Tribunal in writing may agree, appeal to the Tribunal in terms of Sections 59 and 65 of the Act.
3. The Tribunal shall not be required to entertain an appeal under the aforesaid sections 59 and 65 in respect of the determination as application for permission to develop or subdivide land if it appears to the President of the Tribunal that permission or approval for that development or subdivision could not have been granted otherwise than subject to the conditions imposed having regard to provision section twenty-five of the Act and of the appropriate development or subdivision order and to any directions given under such order.
4. In certain circumstances a claim may be made against the Minister or Planning Authority for compensation or acquisition of the land affected where permission or approval is refused or granted subject to conditions. The circumstances under which such compensation is payable or acquisition of land may be required are set out in Part VI of the Act.

APPENDIX F: COPPER PROCESSING PLANT /PROCESS LAYOUT



Copper Processing Plant - Mumbwa



GENERAL NOTES
 150mm thick topsoil to be removed and stored.
 All vegetational matter to be removed and kept in compost heap.
 All excavated surfaces to be treated with an approved ant poison.
 All blockwork below slab level to be solid.
 Brickwork to be laid every 3rd course.

THIS DRAWING IS COPYRIGHT. NO REPRODUCTION OR ALTERATION IS ALLOWED WITHOUT PERMISSION FROM ARCHITECT S.T.A.

REVISIONS

LETTER	DATE	DESCRIPTION

CLIENT
 CEDARS MINERALS LTD

PROJECT
 PROPOSED SITE LAYOUT PLAN WITH COMPLETE COMPONENTS AND DIMENSIONS ON FARM NO. 11303 - MUMBWA

TITLE
 SITE LAYOUT

DATE JAN 2020	PROJECT NO. S.T.A. 087100002
DESIGNER S.T.A.	SCALE AS SHOWN

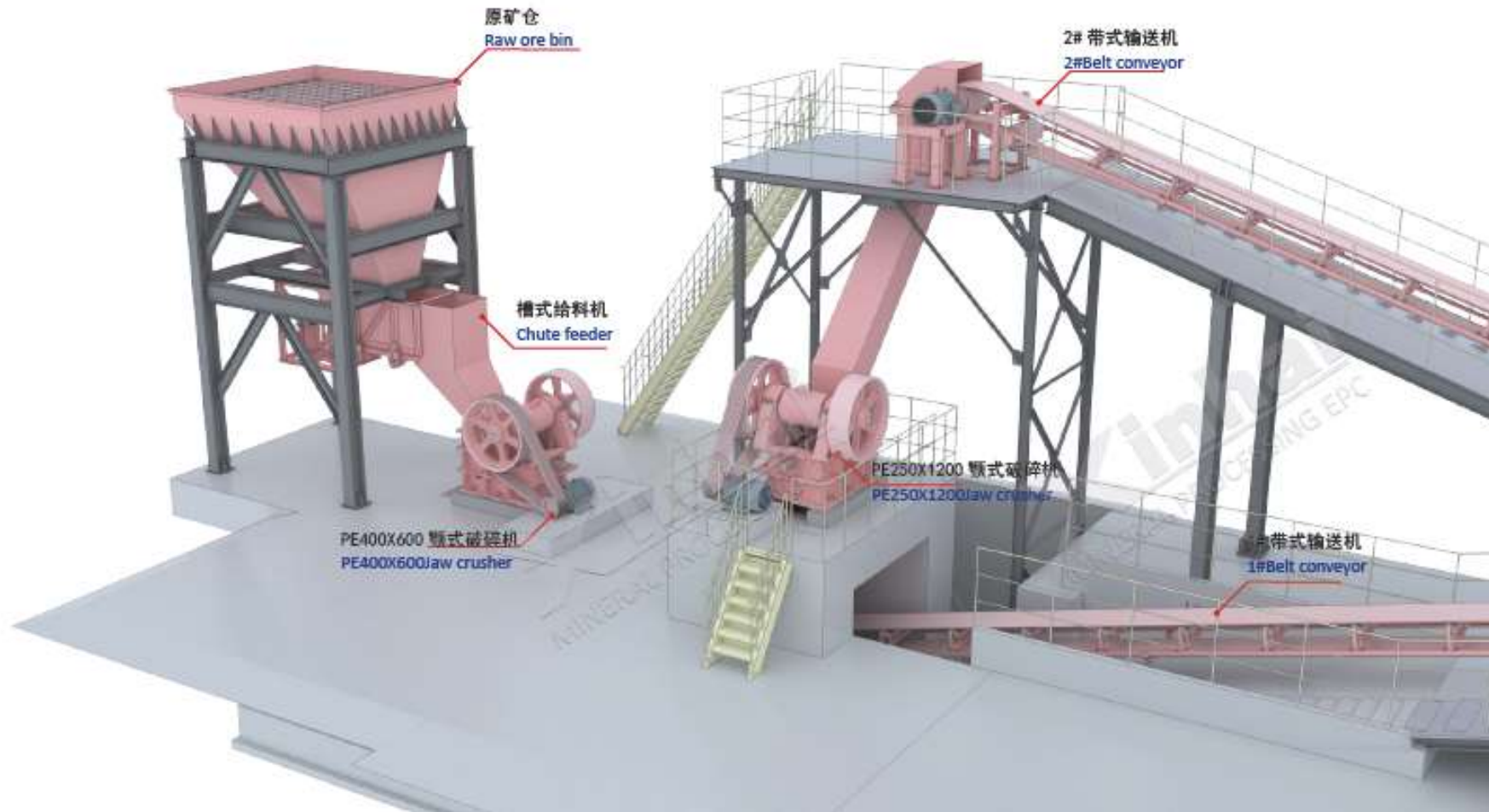
1、整体配置图

General Layout Drawing



2. 破碎车间配置图

Crushing Workshop Layout View



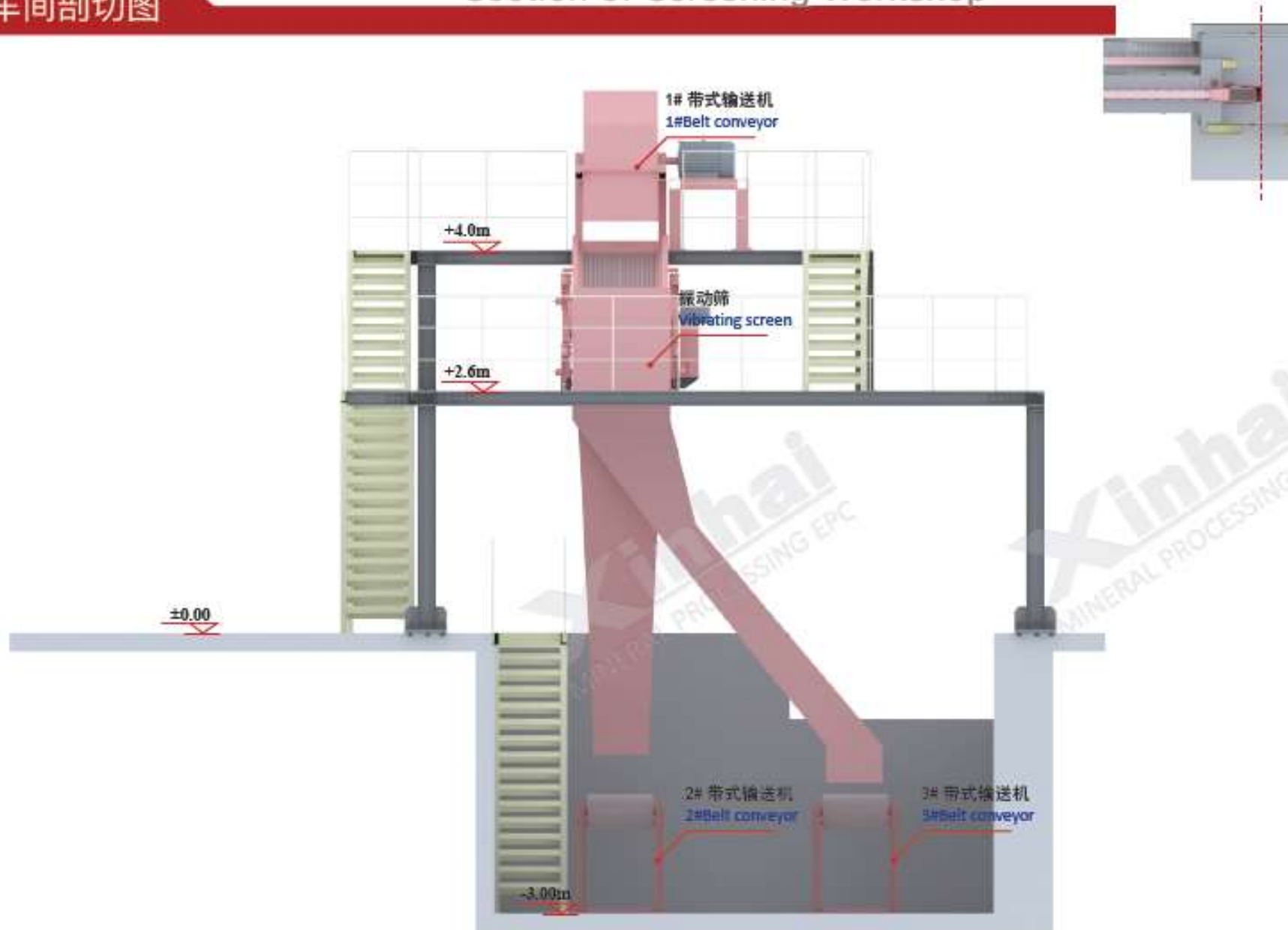
3. 筛分车间配置图

Screening Workshop Layout View



4. 筛分车间剖切图

Section of Screening Workshop



5. 主厂房配置图

Layout drawing of Main workshop



APPENDIX G: WATER, NOISE AND AIR QUALITY REPORT

ABBREVIATIONS, NOMENCLATURE & ACRONYMS

CML	Cedars Minerals Limited
CO	Carbon Monoxide
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMMP	Environmental Management and Mitigation Plan
EMP	Environmental Management Plan
GRZ	Government of the Republic of Zambia
IFC	International Finance Corporation
ND	Not Detectable
NO_x	Oxides of Nitrogen
PAC	Potential Areas of Concern
SHEQ	Safety Health Environment and Quality
SO₂	Sulphur Dioxide
ZEMA	Zambia Environmental Management Agency
ZESCO	ZESCO Limited
ZMAC	Zambian Maximum Allowable Concentrations
&	And
%	Percentage

WEIGHTS & MEASURES

km	Kilometre
mg	Milligram
Kg	Kilogram
Kv	Kilovolts
dB	Decibel
ha	Hectare
km²	Square kilometre
m	Metre
m²	Square metres
m³	Cubic metres
mg/l	Milligrams per litre
Mm³/a	Million cubic metres per year
µg/l	micrograms per litre
µm	micrometer (micron)

EXECUTIVE SUMMARY

Project Background

Cedars Minerals Limited (CML) is a newly incorporated company in Zambia. They intend to explore and grow the mining sector in the country by constructing and operating a copper processing plant in Kitumba area of Mumbwa district. CML intends to construct a concentrator to process 300 tons per day of copper ore sourced from the big concession area of Mumbwa district. Cedars Minerals Limited has also engaged a local license owner – Minetech Resources Limited and signed a copper ore supplying agreement with the same company to shall supply up to 300 tons per day of Copper Ores.

The proposed plant will produce 10 tons per day of copper concentrate.

Cedars Minerals Limited intends to construct and operate a copper processing on farm No. 11383 in Kitumba area of Mumbwa district. It will ensure environmental sustainability of operations of the plant through preparation of the EIA and therein, an Environmental Management Plan (EMP) as per the Zambian legal requirements.

Location

The site for the copper processing concentrator is located in in Kitumba Area, Chief Kaindu's chiefdom, on Mumbwa-Kasempa Road, Mumbwa District, and 45 kilometers southwest of Mumbwa Town. The proposed site is located in Mumbwa District and is a brownfield area accessed by driving 45 kilometers southwest of Mumbwa Town on the D181 dirt road towards Kasempa and covers an area of 94 hectares.

Sampling Criteria

The choice of sampling points was dependent on the distances and directions relative to proposed site for Copper processing project. The presence of human activity and settlement was also considered in selecting the points. The main objective of this exercise was to establish the base line noise, water and air quality data.

A Garmin Quest, Global Positioning System (GPS) Navigation instrument, was used by the study team to capture and record some of the geographical data at the Project site. GPS coordinates were collected, recorded on the instrument, and later exported to a web-based Google earth App for analysis. Photographs of some boreholes, streams, and Rivers were taken using One Plus camera and included in the EIS report.

Air Quality, Noise, and Dust

The main sources of dust emissions that can reduce local air quality within the project area include movement of vehicles along the Mumbwa-Kasempa road. During construction phase, the surrounding human communities, flora, and fauna have the potential of being exposed to dust emissions. During operation phase, the crushers in the plant will also be a source of air pollution. The ambient air concentration levels of Particulate Matter (PM_{2.5} and PM₁₀) were within the emission limit set by ZEMA.

Noise

There is less noise at the project site which mostly is background noise. Once the plant is operational, the main source of noise will be offloading bay, crushing plant, movement of utility vehicles and heavy duty equipment such as loaders and forklifts, trucks bringing copper ore and loading copper concentrate and other products and by products. The workers and local

communities near the plant could be considered to be sensitive receptors.

Noise levels measured at the site during assessment indicated within (minimum of **39 dBA** at roadside boundary of proposed site) WHO limits of 80dBA 30m away from Mumbwa-Kasempa Road and above (maximum of **77 dBA**) WHO Limits on the Mumbwa –Kasempa road when vehicles are passing.

Water quality

Surface water sources are limited around the project with no stream. However, the ground water sources are available (at about 70m and 150m deep in the dry season but during the rainy season the water table rises (30m to 50m deep). According to the samples obtained from on-site borehole and analyzed on-site, the parameters analyzed were within the ZABS Standards for Drinking Water making the water fit for human consumption (See attached laboratory certificate in the appendix).



.....
Bwalya L. Mwale

Environmental Specialist

1. INTRODUCTION

The Developer is proposing to construct a copper processing concentrator and associated facilities in Kitumba area of Mumbwa District in Central Province. The concentrator will be designed to process 300 tons per day of copper ore producing approximately 10 tons of concentrate.

The water, noise, and air quality study is designed to assess the current water, noise, and air quality in the project area before the project commencement and to assess potential future water, noise and air quality impacts during the construction and operation of the proposed copper processing plant. The potential impacts are assessed against the provisions of the Environmental Management Act (Licensing) Regulations 2013, Emission Limits for Ambient Air Pollutants and ZABS Drinking Standards. The study has proposed mitigation measures for all adverse impacts.

1.1 Project Background

Cedars Minerals Limited is a Zambian registered company incorporated on 16th February, 2022. CML intends to construct a concentrator to process 300 tons per day of copper ore sourced from the big concession area of Mumbwa district. Cedars Minerals Limited has also engaged a local license owner – Minetech Resources Limited and signed a copper ore supplying agreement with the same company to shall supply up to 300 tons per day of Copper Ores.

1.1.1 Objectives of the study in relation to the overall project

The ultimate aim of this report is to provide information that will be a part of the baseline to establish an environmental benchmark against which the proposed project can be measured.

The objective of the water, Noise, and air quality study is to assess the potential impacts that may arise mainly from the construction and operation of the proposed project, windblown dust that may arise from construction vehicles. The effects of particulate emissions and dust from the heavy mobile machinery and operation of the crushers are also assessed on their impacts in the environment.

The specific objectives of the water, air quality and noise survey were:

- To obtain baseline data on the levels of groundwater, surface water and establish ambient dust within and around the proposed site prior to project implementation. The levels obtained will represent baseline information of the project area;
- To understand the baseline noise levels in decibels.

1.1.2 Location of the Project

The site for the copper processing plant is located in in Kitumba Area, Chieft Kaindu's chiefdom, on Mumbwa-Kasempa Road, Mumbwa District, and 45 kilometers southwest of

Mumbwa Town. The proposed site is located in Mumbwa District and is a brownfield area accessed by driving 45 kilometers southwest of Mumbwa Town on the D181 dirt road towards Kasempa.

Table 16-1: Proposed site coordinates

TABLE 1.3: CML SITE COORDINATES			
Beacon No.	Description	Eastings	Northings
1	Corner point A	E-483298.852	N-8369996.933
2	Corner point B	E-484164.854	N-8370516.678
3	Corner point C	E-484426.532	N-8369396.776
4	Corner point D	E-483453.211	N-8369228.321

1.2 *Scope of the Work*

The scope of work involved:

- Desk study of available information from CML for proposed plant technology.
- Site visits to get a clear view of site conditions and location of communities and other facilities in the area.
- Air quality sampling of existing condition in the area before project commencement.
- Water quality sampling in one location (on-site borehole)
- Determination of impact areas for proposed crushing plant area, windblown dust from the construction and operations and dust from haulage road (Mumbwa-Kasempa road)
- Noise level measurements of existing condition in the area before project commencement
- Determining impacts that require mitigation and recommend mitigation measures and monitoring plans.

1.2.1 **Study Area**

The spatial boundaries for the study area were one Kilometer (1km) radius from the boundary of the proposed copper processing plant but also areas where significant environmental and socio-economic impacts can be induced by the project. These areas will include surrounding

developments which are all within the 1km radius. The study assessed all the environmental and social facets of the project throughout the entire life cycle from construction and operation to decommissioning and closure phases.

1.2.2 Study Aspect

The Water, Noise, and air quality is focused on what potential impacts will arise during construction, operation, and decommissioning of the copper processing plant. The main potential pollutant of study is the PM₁₀ and TSP (PM_{2.5}). The operations have potential to release dust on the roads and fine materials in the project site could be dispersed naturally by prevailing winds in the area. Noise levels are expected to be high during operations at the site.

1.3 Sampling Methodology

1.3.1 Approach to Assessment

The Methodology and the approach to assessment are outlined below.

Ambient Air Quality

Ambient air quality monitoring is on the baseline studies included as part of the EIA study. The monitoring was conducted to establish ambient air quality baseline conditions within the project area prior to the construction and operation of the proposed copper processing plant. A multi-gas analyser (JBL-B600) was used to analyse ambient air quality at predetermined sampling points (I.e. on the northern, southern, western, and eastern sides of the proposed site).

The results were compared with ZEMA Ambient Air quality guidelines. A Dust Mate instrument for measuring PM₁₀ and PM_{2.5} particles was used to determine the baseline values in the proposed area surrounding community.

The monitoring exercise was conducted at selected sampling points for a day to be able to get representative results indicative of the baseline ambient air quality within the project area prior to commencement of the project.

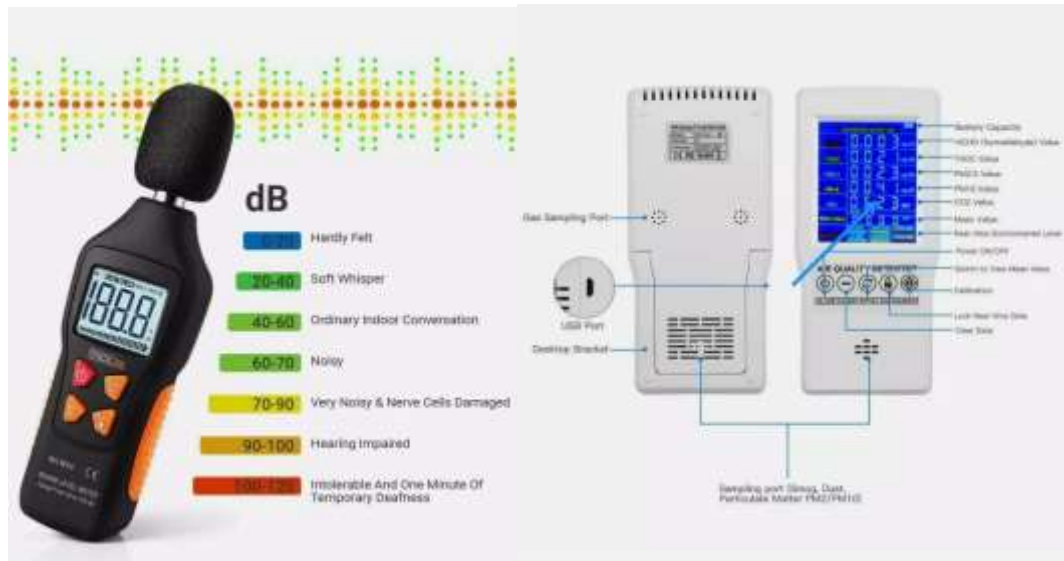
Noise levels

Noise levels within the project site were sampled using a sound level meter (MM-SMB01). This equipment is a hand-held noise logger machine and noise levels were sampled at close range to the source where 1.2m above the ground.

Noise measurements were taken in the same location as for the air quality. The following methodology was employed to determine the levels of noise at the project site;

- Identification of the stationery and mobile sources of noise
- Classification of noise level range using the sound level meter (range between 30-80dB for low;80-100 for medium and 100-130 for high level noise generation)

- Measurement of the noise level at the point of generation
- Determination of activity leading to noise generation.
- Noise level zoning of areas near the sources at predetermined distances to sensitive receptors within the project site.



This assessment was conducted to establish baseline data for the project site. Readings were obtained for each sampling point and for each point 10 to 15 minutes was used as duration for the determination of acceptable or non-acceptable noise levels. The noise guidelines limits followed were the IFC/World Bank guide lines.

Surface and Groundwater Quality

The quality, quantity, and direction of groundwater flow at the proposed site are not elaborately defined. A borehole exists at the proposed site. The monitoring of surface water was not conducted as there are no streams within the 1km radius from the proposed site. A multi-water parameter analyzer was used to analyze ground water quality one location. The results were compared with ZABS Drinking Water standards statutory limits.

1.3.2 Consultation

The water, noise and air quality study were informed by the submissions of stakeholders' concerns on mainly dust, air emissions and noise from the construction and operations. The air quality sampling was conducted were the indicated experiences with some dust in the area. Experience was gotten from the excavation activities at the site.

2. LEGISLATIVE INSTITUTIONAL FRAMEWORK

THE ENVIRONMENTAL MANAGEMENT ACT, No 12 of 2011

The Environmental Management Act No. 12 of 2011 provides for amongst other matters, principles governing environmental management; the continued existence of the Environmental Council of Zambia which has been re-named as the Zambia Environmental Management Agency (ZEMA); functions of the board of the Agency; and integrated environmental management.

Further provisions are for environmental protection and pollution control as well as management of specific issues of environmental management to do with water and air pollution control, waste management, pesticides and toxic substances, noise, ionizing radiation regulation, ozone depleting substances and natural resources management. In addition to being addressed in the main provisions of the Act, these issues have been addressed in regulations specific to them, particularly under the Environmental Management (Licensing) Regulations.

Other matters provided for relate to international environmental agreements, environmental information, public participation, the creation of an environmental fund; enforcement provisions; reviews and appeals; environmental offences and general provisions; and for the making of Regulations by the responsible Minister. For purposes of administering, monitoring, and enforcement of environmental protection and pollution prevention provisions, the Act provides for the establishment of an inspectorate and appointment of inspectors.

The sections of the EMA below are relevant: -

a) Environmental Impact Assessment Regulations (SI No. 28 of 1997 Part 2 and 3)

These regulations require developers of projects set out in Schedule 1 to provide an environmental project brief to the Zambia Environmental Management Agency. If the Agency finds that the project will have a significant impact on the environment, it may require the developer to submit an environmental impact statement. Development plans which require briefs or impact statements include projects involving urban development, transportation, dams, rivers, mining, waste disposal, forestry, manufacturing, and certain types of agricultural activity. This regulation prohibits the undertaking of any project that may have an effect on the environment without the written approval of the Agency, and except in accordance with any conditions imposed in that approval.

Relevance: This Statutory Instrument is relevant to the proposed project because the

Developer intends to establish a copper processing plant that requires an Environmental Impact Assessment.

Compliance there of: The EIA being prepared comprise of specialized studies, this one being one of them in compliance with the above legal provisions.

ENVIRONMENTAL MANAGEMENT (LICENSING) REGULATIONS, STATUTORY INSTRUMENT No. 112 OF 2013

The Environmental Management (Licensing) Regulations were made by the Minister responsible for the environment in exercise of powers contained in Sections 43 and 134 of the Environmental Management Act of 2011 and in consultation with ZEMA. They regulate air and water pollution; waste management; hazardous waste; pesticides and toxic substances; and ozone depleting substances. They also have general provisions.

Regulations that are of particular relevance to the proposed project are outlined below.

a) **The Air Pollution Control Regulations 4(1) of SI 112 (2013):**

Matters pertaining to air and water pollution are set out in Part II, which also specifies licensing requirements and prescribes emission limits for air and water pollution control applicable to plant, undertakings or processes that emit air pollutants. An emission limit is “the maximum limit, level, rate, amount or concentration of a given substance permitted to be discharged into the atmosphere”.

Regulation 4(1) requires any person who intends to emit or discharge a pollutant or contaminant into the environment to make an application to ZEMA for an emission license in the prescribed form. However, this Regulation does not apply to the discharge of pollutants into a sewer within an area that is subject to operations of a water utility or local authority, unless such utility or local authority does not approve the discharge of such pollutants into the sewer. The Regulation also does not apply to the discharge of pollutants on private property unless the owner of the sewer approves such discharges into the sewer.

In terms of Regulation 6, ZEMA has a duty to assess the quality of ambient air in accordance with prescribed guidelines and to regulate emissions of air pollutants into the atmosphere in order to protect human health, animal and plant life as well as the environment.

Relevance: There may be various sources of air pollution in the proposed project - during the pre-construction and implementation stages.

Compliance: The project developer will need to obtain a license from ZEMA. Sustainable and environmentally sound processes will need to be adopted for the management of air pollutants in accordance with the stipulated requirements under the Environmental Management (Licensing) Regulations. The project should be managed in such a way as to minimize discharge of air pollutants in question into the atmosphere as well as contracting independent monitors (environmental consultants) to conduct regular emissions monitoring at construction and operation stage to ascertain the levels of air pollution contribution by the project activities.

b) Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 Part II – Effluent discharge control.

This regulation provides for the licensing of liquid waste discharge limits for respective parameters. Operational stage of this proposed project may cause contamination of storm water by hydrocarbons; therefore, measures have to be put in place to comply with the provisions of this regulation.

Relevance: these regulations are relevant in that the proposed project has potential to leak, spill or wash effluents into the environment causing pollution.

Compliance: The trucks, crushing/washing machines which will be used during the operation will be routinely serviced to avoid excessive oil leakages. Effluent from the plant will also need to be pretreated before discharged into the environment.

IFC STANDARDS ON NOISE

International Finance Corporation General Approach to the Management of EHS Issues (Noise) at the Facility or Project Level require the generation of non-disruptive noise within the area of operation. Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception.

The IFC General guidelines on Noise highlight the levels of noise that must be generated for industrial facilities and exposure limits for individuals.

Relevance: The regulation is relevant as the activities at the proposed facility have the potential to generate audible noise levels above the maximum allowable limits.

Compliance thereof: The developer will adhere to the internationally acceptable practice in noise level generation and implement noise abatement technology in areas of high-level generation.

3. SAMPLING

The choice of sampling points was dependent on the distances and directions relative to proposed site. The presence of human activity and settlement was also considered in selecting the points. The main objective of this exercise was to establish the base line noise, water and air quality data.

3.1 *Location of the sampling points* *Air sampling*

The Air quality study was conducted over a period of 24 hours in which ambient air quality data was obtained by way of periodical measurements in the morning and evening of the 24-hour duration. Three sampling points were identified and the levels of PM₁₀ and PM_{2.5} were measured. Three sample results were obtained for each sampling point and analyzed (only final results were recorded for each). Potential areas of concerns were two in total located at different areas within the project area. The following are the coordinates for the three sites:

Groundwater sampling

Two boreholes exist at the proposed site. One sample was picked and analyzed onsite.

4. RESULTS

The choice of sampling points was dependent on the distances and directions relative to proposed manganese mine. The presence of human activity and settlement was also considered in selecting the points. The main objective of this exercise was to establish the base line water, noise and air quality data.

4.1 Results

AIR AND NOISE RESULTS



AIR AND NOISE RESULTS

Ambient Dust Emissions and Noise Analysis

Date: 17th June, 2022

Site: **Kitumba area, Mumbwa District**

Method of noise sampling: Noise meter (MM-SMB01)

Method of dust sampling: Multifunctional air detector (JBL-B600)

Sampling Date	Sampling Point GPS Coordinates	Dust Results ($\mu\text{g}/\text{m}^3$)		Noise (dBA)
		PM 2.5	PM 10	
17/06/2022	14°45'1.56"S 26°50'58.57"E	19	29	39
17/06/2022	14°45'4.83"S 26°50'45.99"E	23	34	52.3
17/06/2022	14°45'8.45"S 26°51'3.04"E	28	37	77
Emission Limited		50 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	80dBA

Sampled by: Bwalya L. Mwale - Environmental Specialist

Signature:

Table 16-2: Proposed site air and noise results

COMMENTS: Air quality at the proposed site was good and below the ZEMA Emission Limits. Noise levels measured at the site during assessment indicated within (minimum of **39 dBA** at roadside boundary of proposed site) WHO limits of 80dBA 30m away from Mumbwa - kasempa Road and above (maximum of **77 dBA**) WHO Limits on the Mumbwa-Kasempa road when vehicles are passing.



Environmental Science & Engineering Consultants Ltd.

Reg No: 120180003983/ Tpin No: 1012334442

Email: eseclimited@gmail.com
Call: +26077420849 / +2609880888

Plot No: 15 Corner of Dr Dancie Kabelega Rd
Town Centre Ndola (Zambia)

WATER ANALYSIS

Date: 17th June, 2022

Site: on-site borehole, Kitumba area Mumbwa District

PARAMETER	RESULTS	LEGAL LIMIT
pH	7.2	6-9
CONDUCTIVITY((<u>µS</u> /CM)	35.6	1500
TSS (MG/L)	≤0.01	≤100
TDS (MG/L)	19	3000
TEMPERATURE OC	7	≤10
TURBIDITY (NTU)	5.02	≤15

Sampled by: Bwalya L. Mwale - Environmental Specialist

Signature:

Table 16-3: Groundwater sample results

5. ANALYSIS

The project Site and the surrounding areas have no industrial activity happening within a 1km radius of the proposed site. However, the proposed site is a designated farm area partly anthropogenic disturbed by farming activities. On analysis of the area, it was concluded that the air quality is generally good owing to the lack of industrial activity likely to cause air pollution. Dust concentration levels emitted at the three sites were very minimal and were below the Zambian Maximum Acceptable Concentrations

There are no heavy or light industrial activities in close proximity to the project area. Therefore, the results of the noise assessment are typical of a rural setting except when heavy equipment and trucks passes through the Mumbwa- Kasempa Road or come to the plant is when abnormal noise levels are recorded.

6. POTENTIAL ENVIRONMENTAL IMPACTS

The identification of the potential environmental and Air quality impacts that may result from project development is based on a review of the project design, the process raw materials, and the process technology to be employed by the Developer. The impacts were identified through site visits during the collection of baseline data through measurements and study of the local area.

POTENTIAL IMPACTS

The anticipated impacts of the proposed project on air will be high given the nature of plant. The following might arise due to the project implementation:

Construction phase

During construction phase at the proposed copper processing plant and related infrastructure, heavy machinery will be used for excavation and compaction. The machinery is likely to cause an increase in the levels of CO, SO₂ and NO_x on the project site coupled with dust during works.

The air quality of the sites during this phase may be compromised due to dust and vehicular emissions from machinery and motor vehicles delivering construction machinery on the sites. Noise levels are also expected to be high due to heavy construction machinery on site.

Operational Phase

Once the plant is operational, the main source of noise will be diesel and petrol vehicles, crusher plant, ore offloading bay, movement of utility vehicles and heavy duty equipment such as loaders and forklifts, trucks bringing the ore and other products and by products. The workers and local communities near the plant could be considered to be sensitive receptors.

7. CONCLUSIONS

The air quality and noise study on the site indicated atmospheric conditions typical of an area in a rural setup with little or no activities. All gases measured were within the acceptable concentrations. Noise levels were also within allowable limits except when the trucks and other heavy vehicles passed the near the propose site on the Mumbwa – Kasempa road. The noise generation impact as a result of the copper processing plant operation will be significant however the impact will be completely abated by the developer.

Water quality was within the ZABS Drinking Water standards making them fit for human consumption. Apart from the outlined observations in certain areas with high levels of noise, the results obtained from the survey are representative of the baseline conditions in the area.

8. APPENDICES

WATER, AIR AND NOISE RESULTS CERTIFICATES



Environmental Science & Engineering Consultants Ltd.

Reg No: 120180003983/ Tpin No: 1012334442

Email: eseclimited@gmail.com
Cell: +26097520441 • +260975008088

Plot No: 25 Corner of Dr Duma, Kabeinga Rd
Town Centre Ndola (Zambia)

AIR AND NOISE RESULTS

Ambient Dust Emissions and Noise Analysis

Date: 17th June, 2022

Site: Kitumba area, Mumbwa District

Method of noise sampling: Noise meter (MM-SMB01)

Method of dust sampling: Multifunctional air detector (JBL-B600)



Sampling Date	Sampling Point GPS Coordinates	Dust Results ($\mu\text{g}/\text{m}^3$)		Noise (dBA)
		PM 2.5	PM 10	
17/06/2022	14°45'1.56"S 26°50'58.57"E	19	29	39
17/06/2022	14°45'4.83"S 26°50'45.99"E	23	34	52.3
17/06/2022	14°45'8.45"S 26°51'3.04"E	28	37	77
Emission Limited		50 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	80dBA

Sampled by: Bwalya L. Mwale - Environmental Specialist

Signature:



Environmental Science & Engineering Consultants Ltd.

Reg No: 120180003983/ Tpin No: 1012334442

Email: esec@esec.com
Cell: +26097420441 / +2609680688

Plot No: 25 Corner of Dr. Damié Kabelenga Rd
Town Centre Ndola (Zambia)

WATER ANALYSIS

Date: 17th June, 2022

Site: on-site borehole, Kitumba area Mumbwa District

PARAMETER	RESULTS	LEGAL LIMIT
pH	7.2	6-9
CONDUCTIVITY((μ S/CM)	35.6	1500
TSS (MG/L)	≤ 0.01	≤ 100
TDS (MG/L)	19	3000
TEMPERATURE OC	7	≤ 10
TURBIDITY (NTU)	5.02	≤ 15

Sampled by: Bwalya L. Mwale - Environmental Specialist

Signature: