RONGXING INVESTMENTS LIMITED

ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED EXPANSION OF LEACH PLANTS 1 & 2 AND CONSTRUCTION OF A COPPER ORE PROCESSING PLANT ON SUBDIVISION A OF SUBDIVISION E OF LOT No. L/541/M, CHAMBISHI, KALULUSHI DISTRICT, COPPERBELT PROVINCE.

Consultants:

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EXECUTIVE SUMMARY

Company Background

Rongxing Investments Limited was incorporated on 16th August, 2016 and has been operating the Sabina based Processing plant from 2017, in compliance with Zambian laws and regulations. The company plays a key role in Zambia's mining sector by processing copper raw materials into copper cathodes, a critical intermediary product in the copper value chain. Positioned within the mineral-rich Copperbelt region, known for extensive mining and processing activities, Rong Xing Investment Limited contributes to Zambia's efforts to enhance resource value through processing. This activity supports the country's goal of maximizing the economic benefits derived from its natural resources.

Project Background

The project constitutes the expansion and technical renovation for an existing hydrometallurgical copper processing operation comprising Leach Plant 1 and 2, with an additional new raw-material preparation and curing Plant to be constructed on Plot 19. The project is designed to transition the company's focus toward the processing of low-grade tailings and high-bonded copper oxide ores. By implementing advanced maturation (curing) and thickening technologies, the facility will increase its production capacity from the current 24.6 tons/day to a target of 56 tons of cathode copper per day (approximately 18,500 tons per annum).

This expansion responds to two regional realities:

- Declining availability of high-grade oxide ore, and
- Vast, underutilized deposits of low-grade tailings and weathered overburden.

The project therefore pivots the facility away from reliance on higher-grade ore inputs and toward a sustainable long-term model based on the beneficiation and processing of low-grade copper-bearing tailings. To achieve this, the project incorporates technological upgrades in grinding, screening, acid curing, leaching, solid–liquid separation, solvent extraction (SX), and electrowinning (EW), supported by the construction of a high-capacity raw-material handling and curing facility.

The expanded system is designed around four core transformation objectives:

- Increasing raw material processing to 4,000 tonnes per day through enhanced screening, crushing, and curing capacity.
- Improving leaching efficiency of both tailings and high-bonded oxide ores through modern mechanical agitation, optimized slurry density, and sulfuric acid curing.
- Enhancing SX–EW capacity through flow reconfiguration, increased mixer–settler efficiency, and the expansion of electrolytic cells with upgraded busbar systems.
- Maximizing water and reagent recirculation through a fully integrated counter-current decantation (CCD) and raffinate return system, sustaining operational stability and minimizing environmental discharge.

The modernized facility will rely heavily on closed-loop water recycling, optimized acid utilization, and a highly integrated hydrometallurgical control philosophy, ensuring that the operation remains economically competitive, environmentally compliant, and technologically efficient.

Objectives of the project

The overall objective of the RongXing Investments Limited project is to expand and technically renovate the existing hydrometallurgical copper processing facility in order to improve operational efficiency, enhance copper recovery from low-grade materials, and ensure long-term environmental and economic sustainability.

The specific objectives of the project are to:

1. **Increase Copper Production Capacity**
   To raise cathode copper production from the current levels to approximately 56 tonnes per day (about 18,500 tonnes per annum) through the expansion of leaching, solvent extraction, and electrowinning (SX–EW) systems.
2. **Enhance Processing of Low-Grade Tailings and Oxide Ores**
   To transition the operation from reliance on higher-grade oxide ores to the beneficiation of low-grade tailings, weathered overburden, and high-bonded copper oxide ores, thereby extending the life of the operation and improving resource utilisation.

3. **Improve Metallurgical Efficiency and Recovery**

   To enhance copper recovery through the introduction of high-pressure acid curing, improved screening and crushing, optimised agitation leaching, and upgraded solid–liquid separation, resulting in higher recovery rates and reduced residual waste.

4. **Reduce Waste Generation and Environmental Liabilities**

   To minimise ore wastage, sulfuric acid over-consumption, and raffinate losses by implementing controlled feed preparation, precise reagent dosing, and closed-loop process solution management.

5. **Upgrade and Modernise Existing Infrastructure**

   To undertake targeted technical renovation of existing Plant 1 and Plant 2, including SX circuit reconfiguration, expansion of electrowinning cells, rectifier upgrades, and improved automation and control systems.

6. **Support Socio-Economic Development**

   To contribute to local and national socio-economic development through job creation, skills and technology transfer, local procurement, and increased fiscal contributions to government revenues

Location of the Project Area

The proposed project site by Rong Xing Investment Limited, is located on Subdivision A of Subdivision E of Lot No. L/541/M within the Chambishi in Kalulushi, Copperbelt Province. Situated 4 kilometres north of the Kitwe-Chingola Sabina Road junction and 2.07 km north-west of the Kitwe-Mufulira Road, the site benefits from direct access to major transport corridors, ensuring logistical efficiency for material and personnel movement. For those traversing from Kitwe's central business district (CBD), the site lies a mere 20 kilometres away and approximately 18.40 km south-west from Mufulira's central business district (CBD). Key landmarks in proximity include Lifesong Twalima Farm, positioned 2.04 km south-east of the plant, and Luongo SDA Church, located approximately 1.5 km east of the plant. The Sabina Central Police checkpoint, situated 3.5 km south the screening plant, provides essential security services to the area. Industrially, the plant is strategically positioned 7.07 km south-east of the NFC Africa Copper Mine, a major copper production facility, underscoring the region's focus on mining and mineral

processing. This location capitalizes on the industrial synergy of the Chambishi Industrial Area, including proximity to the Chambishi Copper Smelter (CCS), ensuring operational efficiency and alignment with Zambia's copper production ecosystem.

Current State of the Environment

The current state of the environment at Plot 19 is characterized by a largely open and level terrain with minimal existing infrastructure, situated adjacent to Leach Plant 2 and across the railway line. The site exhibits sparse natural vegetation, primarily grasses and scattered shrubs, with no significant water bodies, wetlands, or sensitive ecological habitats present within the footprint. The area is industrially zoned, with low socio-economic activity and no permanent residential settlements, although local communities may access the land for farming and other informal purposes. Its proximity to existing processing infrastructure and basic access roads provides strategic advantage for integration with the planned 4,000 t/day wet screening and slurry preparation facility, while minimizing potential environmental constraints related to flora, fauna, water resources, or community disruption.

Table 1 Geographic Coordinates of the proposed project

POINTS	LATITUDE	LONGITUDE
A	12°41'12.37"S	28° 7'25.29"E
B	12°41'10.88"S	28° 7'28.63"E
C	12°41'1.72"S	28° 7'24.25"E
D	12°41'3.59"S	28° 7'20.63"E
Leach Plants Coordinates		
Leach Plant 1	12°41'44.03"S	28° 7'29.49"E
Leach Plant 2	12°41'17.22"S	28° 7'21.74"E

Shareholders

The tables below present the shareholders and directors of Rongxing Investments Limited.

Table 2 Shareholders and Directors

Shareholding Structure

Business Entities

Present forenames and surnames	Nationality	Physical Address	Position	Shares (%)
SHANHAI XUNKUANG	**CHINA**	Shanghai Putuo District North Zhongshan Road No. 2438 Zhongrui Business Building 13th floor Broom Shanghai, xunkuang, CHINA	Company	1%
YUNNAN JINXUN	**CHINA**	Huijin Building A, Floor 25, No.1666 of Haiyuan road North Kunming city, Yunnan Jinxun	Company	99%

Individuals

Present forenames and surnames	Nationality	Identity Type	Identity Number	Director / Partner	Secretary	Shareholder / Member	Shares (%)
Yuan Liming	China	Passport	EJ5427690	Yes			
Zhou Xiong	China	Passport	EP1776777	Yes			
Sosa Mwaba	Zambia	National ID	312319/66/1		Yes		

Investment cost

The project investment cost is estimated at $8 million dollars.

Summary description of the Project

Project Overview

RongXing Investments Limited proposes the expansion and technical renovation of its existing hydrometallurgical copper processing facility located in Chambishi, Kalulushi District, Copperbelt Province. The project is situated on Subdivision A of Subdivision E of Lot No. L/541/M, within the Chambishi Industrial Area.

The project comprises two core components:

1. Construction of a new front-end raw material preparation and high-pressure acid curing facility on Plot 19, and
2. Expansion and upgrading of existing Leach Plants 1 and 2, including solvent extraction (SX) and electrowinning (EW) systems.

The objective of the expansion is to transition the operation from reliance on higher-grade oxide ores to the processing of low-grade copper tailings and high-bonded/weathered oxide ores, responding to declining high-grade ore availability and the presence of extensive underutilised tailings in the region. Following expansion, processing capacity will increase to approximately 4,000 tonnes of raw material per day, with cathode copper production rising from 24.6 t/day to about 56 t/day, equivalent to ~18,500 t per annum.

New infrastructure on Plot 19 will include an enclosed high-pressure acid curing building with a footprint of approximately 6,000 m² (200 m × 30 m × 7 m), designed for 5–7 day curing cycles and 6 m stockpile heights. Supporting systems will comprise relocated wet screening units, new impact crushers producing a target particle size of ~5 mm, agglomeration and mixing equipment, slurry preparation facilities, and a high-rate thickener achieving approximately 90% washing efficiency for pregnant leach solution (PLS) recovery.

The upgraded process will remain a fully integrated hydrometallurgical flowsheet, including crushing and screening, controlled acid curing, mechanically agitated leaching, counter-current decantation (CCD), solvent extraction, and electrowinning. SX circuits in Plants 1 and 2 will be reconfigured to handle solution flows of up to 600 m³/h, with additional extraction and stripping stages, enlarged mixer–settlers, and upgraded impellers. Electrowinning capacity will be expanded to 60 cells in Plant 1 and 50 cells in Plant 2, powered by rectifiers rated at 20,000 A / 90 V and 22,000 A / 125 V, producing 99.99% purity LME-grade cathode copper.

Primary raw materials will consist of low-grade tailings and high-bonded oxide ores with copper grades typically ranging from 0.4% to 1.0% Cu. Key reagents include sulphuric acid for curing and leaching, SX organic extractants with kerosene diluents, and auxiliary oils and lubricants. Process water will be managed through a closed-loop system, utilising recycled thickener overflow and tailings return water, with limited fresh water supplementation to maintain water balance.

To convey PLS across the railway separating Plot 19 from existing plants, the project will install an above-rail pipebridge carrying corrosion-resistant pipelines with leak detection and containment features. This configuration ensures safe, continuous transfer while avoiding subsurface construction risks.

The project will be implemented through site preparation, construction, commissioning, operation, and eventual decommissioning phases. The anticipated operational life is approximately 15 years.

Project Alternatives (chosen alternatives in order of preference)

Preferred Product and Service Alternative

The preferred product and service alternative is the production of copper cathode through hydrometallurgical processing using acid leaching and solvent extraction–electrowinning (SX–EW).

This alternative is selected because it represents the highest level of value addition within the copper value chain and is fully aligned with the company's existing infrastructure, technical expertise, and strategic objectives. Producing LME-grade cathode copper enables efficient utilization of low-grade tailings and high-bonded oxide ores that are otherwise uneconomic for direct sale or conventional mining. The hydrometallurgical route allows controlled processing, improved environmental management, and stable production of a high-purity final product, while supporting national mineral beneficiation policies and long-term economic sustainability.

Preferred Site Alternative

The preferred site alternative is the development of new raw-material preparation and acid curing infrastructure on Plot 19**.** This site provides sufficient space to accommodate the required enclosed curing building and associated processing systems and is strategically located near existing leach and recovery plants. Development on Plot 19 minimizes material handling distances, avoids congestion at existing operational areas, and limits additional land disturbance by utilizing an established industrial zone.

Preferred Design Alternative

The preferred design alternative is the integrated expansion and technical renovation design, which combines the construction of new front-end feed preparation and curing facilities with the upgrading and reconfiguration of existing leach, solvent extraction, and electrowinning systems in Plants 1 and 2. This design ensures that increased feed preparation capacity is matched by adequate downstream recovery capability, thereby maintaining operational balance, metallurgical efficiency, and environmental control.

Preferred Technology Alternative

The preferred technology alternative is hydrometallurgical copper processing incorporating acid curing, agitation leaching, counter-current decantation, solvent extraction, and electrowinning. This technology is best suited to the mineralogical characteristics of the available low-grade tailings and oxide ores and allows efficient copper recovery with relatively low energy intensity and reduced atmospheric emissions compared to thermal processing routes.

Preferred Process Configuration Alternative

The preferred process configuration is the modified solvent extraction configuration optimized for low-grade pregnant leach solution, incorporating multiple extraction stages, organic washing, and optimized stripping. This configuration improves mass transfer efficiency, reduces organic losses, and enhances cathode quality under dilute solution conditions.

Preferred Raw Material Alternative

The preferred raw material alternative is the use of locally available low-grade tailings and high-bonded oxide ores**.** This option ensures long-term feed availability, reduces reliance on third-party suppliers, supports reprocessing of legacy materials, and aligns with the hydrometallurgical design of the plant.

Preferred Water Resource Alternative

The preferred water resource alternative is maximum process water recycling, utilizing thickener overflow return, tailings storage facility return water, and controlled fresh water supplementation only where necessary. This approach minimizes freshwater abstraction and supports stable hydrometallurgical operation.

Preferred Energy Resource Alternative

The preferred energy resource alternative is the use of grid electricity supplemented by standby diesel generators**.** This configuration provides reliable power for high-current electrowinning operations while minimizing fuel consumption, emissions, and operational costs.

No Project Option

This alternative is technically sound and aligns with the strategic need to utilize abundant tailings and overburden resources. It enables modernized slurry systems, improved leaching kinetics, and a shift to a sustainable long-term feed source. The initiative will also enhance copper recovery efficiencies by integrating a high-capacity thickener system, upgraded SX mixers, and additional EW cells. Environmentally, it minimizes reliance on high-grade ore mining.

Potential Environmental and social Impacts / Enhancement and Mitigation measures

Positive Environmental and Social Impacts and Enhancement Measures

Improved Resource Efficiency and Waste Reduction

The introduction of high-pressure acid curing, improved screening, and optimised agitation leaching will significantly enhance copper recovery from low-grade tailings and oxide ores. This will reduce residual metal content in tailings and minimise long-term environmental liabilities associated with waste disposal. RongXing will implement continuous process optimisation, automated reagent dosing, and real-time monitoring systems to sustain high recovery efficiency and reduce chemical wastage.

Reduced Pressure on Primary Ore Resources

By processing historical tailings and overburden materials, the project will decrease reliance on virgin ore extraction. This supports circular resource use and contributes to remediation of legacy mining waste. RongXing will formalise responsible sourcing arrangements and maintain traceability of all feed materials to ensure compliance and environmental accountability.

Employment Creation and Skills Development

The project will generate direct and indirect employment during construction and operation, including skilled roles in plant operations, maintenance, and environmental monitoring. RongXing will prioritise local recruitment, provide targeted technical training, and support skills transfer through structured on-the-job training and partnerships with vocational institutions.

Local Economic Stimulation

Increased demand for goods and services such as transport, catering, fabrication, and maintenance will stimulate local businesses. RongXing will implement a local procurement policy and maintain transparent engagement with suppliers to enhance local economic participation.

Negative Environmental Impacts and Mitigation Measures

Soil Contamination and Acidification

Handling and storage of sulphuric acid and process solutions pose a risk of soil contamination through spills or leaks. RongXing will construct all chemical storage and handling areas with lined and bunded containment, install leak detection systems, maintain neutralising agents on site, and conduct routine soil monitoring in high-risk areas.

Soil Erosion and Land Disturbance

Earthworks and site clearing may increase erosion risk, particularly during the rainy season. RongXing will implement phased clearing, strip and conserve topsoil, install erosion and sediment control structures, and undertake progressive rehabilitation using native vegetation.

Surface Water Contamination

Runoff from process and storage areas could transport acidic or metal-laden water to nearby drainage channels. RongXing will implement engineered stormwater management systems, impermeable process floors, sedimentation and neutralisation ponds, and routine upstream and downstream water quality monitoring.

Groundwater Pollution

Subsurface leakage from pipelines or tanks could affect groundwater quality. RongXing will install monitoring boreholes, use double-walled pipelines where feasible, conduct periodic groundwater sampling, and implement rapid response procedures for any detected contamination.

Air Quality Degradation (Dust and Acid Fumes)

Material handling and acid use may generate dust and fumes. RongXing will install dust suppression systems, enclose transfer points, provide local exhaust ventilation, and conduct routine air quality monitoring to ensure compliance with regulatory limits.

Noise and Vibration

Construction and operational machinery may increase ambient noise levels. RongXing will use well-maintained equipment, install acoustic enclosures where necessary, restrict high-noise activities to daytime hours, and implement periodic noise monitoring at sensitive receptors.

Loss of Vegetation and Habitat Disturbance

Clearing of land may temporarily reduce vegetation cover and disturb fauna. RongXing will minimise clearing to approved footprints, retain buffer zones where possible, and rehabilitate disturbed areas using indigenous plant species.

Negative Social Impacts and Mitigation Measures

Occupational Health and Safety Risks

Exposure to chemicals, dust, noise, and heavy machinery presents risks to workers. RongXing will implement comprehensive occupational health and safety systems, provide appropriate PPE, conduct regular training, and maintain emergency response facilities on site.

Public Health Risks

Dust, traffic, and potential water contamination could affect surrounding communities. RongXing will implement dust and traffic management measures, ensure safe water management, and collaborate with local health authorities on awareness and prevention programmes.

Traffic and Road Safety Risks

Increased movement of heavy vehicles may elevate accident risks. RongXing will enforce designated haulage routes, speed controls, driver training, and vehicle safety standards, and coordinate with local authorities.

Social Tension and Inequitable Benefit Distribution

Perceived unequal access to jobs or business opportunities could lead to grievances. RongXing will maintain transparent recruitment and procurement processes, establish a grievance redress mechanism, and engage communities through regular consultations.

Summary of Environmental Baseline study findings

Setting and sensitivity: The project site (Plot 19) lies within the Chambishi Industrial Area, Kalulushi District, on open, level ground with sparse grass/shrub cover and minimal existing infrastructure. No wetlands, protected habitats, or permanent surface water occur within the footprint, but the Luela Stream (0.68 km west) and groundwater used by communities are key sensitive receptors.

Climate: Subtropical Copperbelt plateau climate with distinct wet (Oct–Apr) and dry (May–Oct) seasons. Rainfall 900–1,000 mm/year; temperatures range 9–12°C (cool season minima) to 30–32°C (hot season maxima). These conditions influence runoff, dust generation, and groundwater recharge.

Air quality: Baseline air quality is generally good. PM_{10} and $PM_{2.5}$ are lowest at the new project site (PM_{10} 6.3 µg/m³; $PM_{2.5}$ 5.3 µg/m³) and highest at the traffic corridor Kitwe–Mufulira roadside (PM_{10} 44.7 µg/m³; $PM_{2.5}$ 27.7 µg/m³). TSP is elevated at the roadside (102.3 µg/m³) relative to other zones. CO, NO_x, and SO_2 were not detected at monitored points.

Geology and hydrogeology: The area is within the Katanga Supergroup (Upper Roan Group) typical of the Copperbelt, with sedimentary host rocks and structural features (fractures or faults) that control groundwater flow. Groundwater occurs mainly in fractured zones and is environmentally sensitive due to community reliance on boreholes/wells.

Hydrology and water quality: The Luela Stream is the main nearby surface water feature. Surface water results show neutral to slightly acidic pH (6.71–6.92), low TDS/TSS, good DO (5.3–5.6 mg/L), and metals generally low; oil/grease and hydrocarbons were below detection. Groundwater from the site borehole is similarly compliant: pH 6.89, low conductivity/TDS, low nutrients, metals within ZEMA limits, low coliforms, and hydrocarbons below detection.

Topography and soils: Terrain is gently undulating (1,200–1,260 m amsl) with low slopes (<5%), low landslide risk, and localized erosion potential if soils are exposed. Soils range from sandy loam/loamy sand to silty clay loam/clay. Soil pH is 6.4–7.2 (slightly acidic to neutral). Metals show expected Copperbelt background trends, with Cu 75–125 mg/kg increasing in finer-textured points; Pb, Zn, Cd, and As are low to moderate and not indicative of significant contamination. Soils are

moderately sensitive to compaction and erosion if vegetation is removed.

Noise and vibration: Baseline daytime noise levels are compliant with applicable guidelines: 49 dB(A) (Luela Residential), 64 dB(A) (RongXing Industrial), 66 dB(A) (roadside), and 58 dB(A) (new project site).

Biodiversity: The area supports disturbed miombo woodland/grassland assemblages with limited wildlife diversity. Recorded fauna are mainly disturbance-tolerant small mammals, reptiles, amphibians, and invertebrates; aquatic fauna is seasonal and limited. Avifauna comprises common miombo/open-area species. No rare, endemic, or IUCN-listed threatened species were recorded. Riparian vegetation along the Luela Stream includes common reeds or sedges and moisture-associated trees (*Phragmites australis*, *Typha capensis*, *Cyperus papyrus*, *Syzygium cordatum*).
Archaeological and cultural environment: No known heritage sites, graves, shrines, or culturally significant features were identified within the project footprint; the area is long disturbed and industrially influenced.

Socio-economic baseline: Chambishi (2022 Census) has a population of 34,888 and a mining-driven economy with livelihoods in mining and processing, logistics, informal trade, and subsistence farming. Governance is under Kalulushi District with active traditional leadership structures. Social services are present but health capacity is limited locally; education institutions in the wider area support skills development and potential workforce linkages. Land tenure is mixed (state/municipal/mining concessions) but the project site is within an industrial zone, requiring continued coordination with authorities and community stakeholders to manage land-use expectations

Project Lifespan

Rongxing Investments Limited estimated that the lifespan of the proposed project will follow the Processing Plant's lifespan which is approximately 15 years from the time it starts its production. Rongxing Investments Limited is yet to start any operations to do with the expansion and renovations and construction of the new plant until after the approval of the ESIA.

Recommendations

The consultant recommends that the regulatory authorities should regular monitoring the project implementation to ensure that the implementation is in line with the proposed measures.

Conclusion

Through an analysis of the project's benefits and drawbacks, as well as the implementation of suitable mitigation and enhancement strategies, it was determined that the proposed project could be effectively managed to guarantee that all benefits are realised and that the local communities and environment are not negatively impacted.

Signatures of Experts

Table 3 Signatures of Experts

Team Member	Qualification	Expertise	Role	Signature
Eng Kelvin Mwansa	Beng. Environmental Engineering	Review Mining Plans and position of mine infrastructure Planning of ESIA activities. Coordinating ESIA activities. Compiling ESIA Reports. Overseeing Public Consultations. Management of Project Budget.	Lead Mining and Environmental Specialist	
Eng Rex Chaaba	Beng. Mining Engineering	Planning of ESIA activities. Coordinating ESIA activities Compiling ESIA Reports Overseeing Public Consultations	Mines and minerals Specialist	
Eng. Chibwe Musonda	Beng. Environmental Engineering	Over 3 years of expertise in conducting Environmental Impact Assessments (EIAs), specializing in compliance monitoring, field data collection (air/water quality, noise, hazardous waste), and regulatory adherence to ZEMA and ISO 14001 standards. Skilled in GIS mapping, environmental management plans (EMPs), and technical reporting, Musonda has successfully contributed to EIAs for mining and industrial projects.	Field Operations Lead and overseeing baseline environmental data collection, ensuring methodological accuracy, and aligning findings with legal standards. Additionally, they would prepare detailed reports, propose mitigation measures, and collaborate with stakeholders to deliver actionable, regulation-	

			compliant results	
Bwalya Kangwa	Metallurgy-Diploma	over four years of experience as an Assistant Metallurgical Research Engineer, specializing in environmental impact mitigation for metallurgical processes. His work includes conducting EIAs for projects such as a copper ore flotation plant and a copper leach plant, demonstrating his expertise in assessing industrial environmental impacts, compliance with ISO standards, and implementing sustainable practices in mining and metallurgy	Analyze metallurgical processes, identify potential environmental risks, and propose mitigation strategies. His technical background in metallurgy, quality control, and safety standards enables him to evaluate industrial operations, ensure regulatory compliance, and contribute to detailed environmental impact reports. His hands-on experience in research and plant operations makes him a valuable asset for assessing and minimizing ecological impacts.	

Mr. Chilumba Mulenga	Bsc. Biotechnology	Describe the status and characteristics of the various ecosystems in the project area, especially those of conservation importance. Conduct field surveys for vegetation and natural resources assessments, including identification of species composition and assessment of their conservational status. Participate in the assessment of project impacts on environmental components. Contribute to the development of mitigation measures. Participate in the production of reports.	Ecology	
Eng. Titus Mulenga	Beng. Environmental Engineering	Over 3 years of expertise in conducting Environmental Impact Assessments (EIAs), specializing in compliance monitoring, field data collection. Skilled in GIS mapping, environmental management plans (EMPs), and technical reporting, Eng Mulenga has successfully contributed to EIAs for mining and industrial projects.	Field Operations Lead and overseeing baseline environmental data collection. He will prepare detailed reports, propose mitigation measures.	
Eng. Nathan Kaela	Beng. Chemical Engineering	Evaluate pollution control systems to minimize emissions of pollutants to air, water, and soil. Develop waste management plans, including strategies for reducing, reusing, and recycling waste materials. Analyze the potential for hazardous waste generation and propose mitigation measures.	Evaluate air, water, and soil quality.	

Mubanga Mutale	Social Sciences	Socio-economic Scientist with over 3 years of progressive experience contributing to community-based research projects. Possesses a strong academic background in Economics and a proven track record in socio-economic data collection, stakeholder engagement, impact analysis, and policy compliance. Adept at using statistical tools (SPSS, STATA, Excel, ODK) to inform data driven environmental and social decisions. Committed to advancing sustainable development goals through evidence-based planning and community consultation	Socio-economic Scientist to undertake socio-economic community-based research.	

NON-TECHNICAL SUMMARY

Non-Technical Summary English

Project Location

The proposed project is located in Chambishi, Kalulushi District, Copperbelt Province, within an established industrial area. The site lies close to major transport routes linking Kitwe, Chingola, and Mufulira, and is adjacent to existing hydrometallurgical facilities operated by RongXing. The project area is zoned for industrial use and does not contain permanent residential settlements, protected ecosystems, or sensitive environmental features within the footprint.

Purpose of the Project

RongXing Investments Limited intends to expand and technically renovate its existing copper processing operations in order to increase production capacity, improve processing efficiency, and ensure long-term sustainability. The project responds to the declining availability of high-grade copper oxide ores and the presence of large quantities of low-grade copper tailings and weathered oxide ores in the region. By upgrading technology and infrastructure, RongXing will recover copper from materials that are currently underutilised.

Nature and Scope of the Project

The project involves:

- Construction of a new raw material preparation and high-pressure acid curing facility on Plot 19, and
- Upgrading and expanding Leach Plant 1 and Leach Plant 2, including solvent extraction (SX) and electrowinning (EW) systems.

Following implementation, copper production will increase from approximately 24.6 tonnes per day to about 56 tonnes per day, equivalent to roughly 18,500 tonnes of copper cathode per annum.

Key Project Components

New Facilities on Plot 19;

RongXing will construct a new enclosed processing plant designed to prepare raw materials before leaching. This facility will include:

- Screening and crushing systems to reduce ore size,
- Mixing and controlled acid curing systems to improve copper recovery, and
- Slurry preparation and thickening systems to separate liquids and solids efficiently.

Upgraded Existing Facilities;

RongXing will upgrade existing leach plants to handle higher processing volumes. Improvements will include:

- Expanded solvent extraction stages to improve copper separation, and
- Additional electrowinning cells and upgraded electrical systems to increase copper output.

Processing Method

The project will use a hydrometallurgical copper recovery process, which is widely applied in the Copperbelt. In simple terms:

1. Copper-bearing material is crushed and mixed with acid,
2. Copper dissolves into a liquid solution,
3. Copper is separated from the solution, and
4. Electricity is used to produce high-purity copper metal in the form of cathode plates.

Raw Materials and Water Use

- Feed material: Low-grade copper tailings and oxide ores
- Main chemical: Sulphuric acid, handled in fully contained and controlled systems
- Water: Mainly recycled process water, with limited use of fresh water only when necessary

RongXing will operate a closed-loop water recycling system to minimise freshwater abstraction and reduce liquid waste discharge.

Products and Waste

Main Product

- Copper cathodes with approximately 99.99% purity, suitable for domestic and export markets.

By-Products and Waste

- Treated tailings safely stored in approved facilities,
- Minor quantities of hazardous and non-hazardous waste from operations and maintenance, and
- General domestic waste from site personnel.

All waste will be managed in accordance with approved environmental regulations and best practice.

Environmental and Social Considerations

Positive Impacts

RongXing will deliver several positive outcomes, including:

- Improved use of mineral resources by reprocessing tailings,
- Reduction of long-term environmental risks associated with historical waste materials,
- Creation of employment during construction and operation,
- Support to local businesses through procurement of goods and services, and
- Contribution to national and local revenues through taxes and royalties.

RongXing will enhance these benefits by prioritising local employment, skills training, and local procurement.

Potential Negative Impacts and Management Measures

Environmental Risks

- Soil and water contamination from chemical handling,
- Dust and air emissions from material handling, and
- Noise from plant operations.

RongXing will manage these risks through bunded and lined storage areas, dust suppression measures, noise control, routine environmental monitoring, and emergency response systems.

Social and Health Risks

- Occupational health and safety risks to workers, and
- Community safety risks from increased traffic and industrial activity.

RongXing will implement strict health and safety procedures, provide personal protective equipment, conduct regular training, apply traffic management measures, and engage with nearby communities.

Project Duration and Closure

The project is expected to operate for approximately 15 years.

Non-Technical Summary Bemba

Ukusupula kwa Milimo mu Cibemba

Icifulo ca Milimo

Iyi milimo iyelelwe ukucitika mu Chambishi, mu boma lya Kalulushi, mu Citungu ca Copperbelt. Icifulo ici cili mu ncende ya mafakitale iyishibikwa kale. Ici cifulo cili mupepi ne nshila shikulu ishalunda amatauni ya Kitwe, Chingola, na Mufulira, kabili cili mupepi ne fikuulwa fya RongXing ifyipika umuku (hydrometallurgical facilities). Iyi ncende yapeelelwa fye imilimo ya mafakitale, kabili tamwaba amayanda ya bwikalo, amatala ya fya mwikashi, nangu ifitungu fya mumpanga ifyacingilwa.

Ubuyo bwa Milimo

Kampani ka RongXing Investments Limited katekanya ukukusha no kuwamyako imishitile ya milimo ya kofya umuku pa kuti bafule ifitwala, ukuwamya amabombele, no kulenga umulimo ukutwalilila pa nshita ntali. Iyi milimo ilecitika pantu amabwe ya muku aya mulingo uwasuma (high-grade) nayacepa, lelo kuli ifishala fya muku ifingi (tailings) ne fiputulwa fya mabwe ifishisuma sana (low-grade) mu citungu. Kupitila mu kuwamya fya kupangila fintu ne fikuulwa, RongXing akalafumya umuku mu fintu ifishibomfya bwino pali nomba.

Imoneke ne fyo Umulimo Ukaba

Iyi milimo ikasanshamo:

- Ukukuula icikuulwa cipya pa Plot 19 icakulasansanya no kupekanya ifipe fya mabwe (raw materials) no kubomfya umuti wa asidi (acid curing).
- Ukuwamya no kukusha ifikuulwa fya kofeshamo umuku (Leach Plant 1 na Leach Plant 2), ukubikapo ne nshila sha kusanda amenshi ya muku (SX) no kupangila imiseke ya muku kuli malaiti (EW).

Nga yapwa, umulimo wa kufumya umuku ukafula ukufuma pa matonni 24.6 pa bushiku bumo ukushika ku matonni 56 pa bushiku, icilingene na matonni 18,500 aya muku uwasuma (copper cathode) pa mwaka.

Ifiputulwa fikalamba ifya Milimo

Ifikuulwa fipya pa Plot 19: RongXing akakuula icikuulwa iciseele (enclosed plant) icakulapekanya amabwe ilyo yashilaikala mu menshi ya asidi. Ici icikuulwa cikakwata:

- Ifyakuseelamo no kuponona amabwe pa kuti yacepe,
- Inshila sha kusakanya no kubomfya asidi (acid curing) pa kuti bafumye umuku uwingi,

- Inshila sha kupekanya amenshi yakandika (slurry) pa kuti bapaatule bwino ifya kukosa ne fya menshi.

Ukuwamya ifikuulwa filipo kale: RongXing akawamya ifikuulwa fya kofeshamo umuku (leach plants) pa kuti fibombe imilimo iikalamba. Ukuwamya kukasanshamo:

- Ukukusha amaceci yakasanda amenshi ya muku (SX) pa kuti umuku upaatulwe bwino,
- Ukubikako ifikuulwa na fimashini fipya ifyapangila umuku kuli malaiti (EW).

Inshila ya Kubombelamo

Iyi milimo ikabomfya inshila ya kupika umuku mu menshi (hydrometallurgical process), iishibikwa sana mu Copperbelt. Mu nshila ya kwanguka:

1. Amabwe umuli umuku yalyaliwa no kusakanishiwa ne asidi,
2. Umuku ulasunguluka no kuba amenshi,
3. Umuku ulapaatulwa muli ayo menshi,
4. Malaiti alabomfyiwa pa kupanga imiseke ya muku uwasuma sana (copper cathode).

Ifibomfiwa na Menshi

- Ifyapikwa: Ifishala fya muku (tailings) na mabwe ya muku aya mulingo uwa panshi.
- Umuti ukalamba: Asidi (Sulphuric acid), iikaba mu fipe ifyakunka kabili ifyacingilwa bwino.
- Amenshi: Yakulaba amenshi yakubomfya na kabili (recycled), amenshi mapya yakulabomfyiwa fye fye nga cakubako ubulafya.

RongXing akakwata inshila ya kupilibula amenshi ayo yene yalebombewa (closed-loop) pa kuti bepula amenshi ayengi mu mupanga kabili pa kuti bepoya amenshi yakwata ubusanso.

Ififumamo ne Fisooso

Icikulu icifumamo:

- Imiseke ya muku (copper cathodes) iyakwata ubusuma bwa 99.99%, iingashitishiwa mu calo nangu ku nse.

Ifisooso:

- Ifishala (tailings) ifyasambulwa bwino no kusungilwa mu ncende ishasuminishiwa,
- Ifisooso finono ifyabipa ne fishabipa ififuma ku milimo ne kuwamyako bamashini,
- Ifisooso fya pa ng'anda ififuma ku babomfi.

Ifisooso fyonse fikasungwa ukulingana ne mafunde ya kucingilala icalo (environmental regulations).

Ifya Kucebusha pa Calo na ku Bantu

Ifisuma ifikafumamo: RongXing akatwala ifisuma ifingi, pamo nga:

- Ukubomfya bwino ifyuma fya mumpanga kupitila mu kupika ifishala,
- Ukulenga ubusanso bwa fisooso fyakale ifyaba mu mumpanga bucepe,
- Ukupela abantu imilimo ilyo kulekuulwa na lintu kulebombwa,
- Ukwafwa amakampani ya mu mishi kupitila mu kushita ifipe ne milimo kuli bena,
- Ukuleta indalama ku buteko kupitila mu misonko (taxes and royalties).

Ubusanso bwingabako ne fyakubucincintila:

- Ubusanso ku mumpanga: Ukonaula umusili na menshi kuli asidi. RongXing akacingilila ici mu kukuula incende sha kusungilamo asidi ishashitilwa kabili ishalambulwa panshi.
- Icushi no lukungu: RongXing akabomfya inshila sha kufuupula lukungu.
- Icipuupu: Ukubomfya bamashini abashipanga sana icongo no kupingula inshita sha kubomba.
- Ubusanso ku bantu: Ukubomfya amafunde yakosa aya kucingilila ababomfi (PPE), ukupeela amasambililo, no kwishibisha abantu ba mu mishi mupepi pa lwa kwenda kwa fyimbuluutwa.

Inshita ya Milimo (Project Duration)

Iyi milimo yenekelwa ukutwalilila pa myaka nalimo amakumi yasano na limo (15 years).

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ABBREVIATIONS

Acronym	Full Form / Meaning
CBD	Central Business District
CCD	Counter-Current Decantation
CCS	Chambishi Copper Smelter
CSR	Corporate Social Responsibility
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMPs	Environmental Management Plans
EPR	Extended Producer Responsibility
ESIA	Environmental and Social Impact Assessment
EW	Electrowinning
GIS	Geographic Information System
HDPE	High-Density Polyethylene
H_2SO_4	Sulfuric Acid
IFC	International Finance Corporation
IWRM	Integrated Water Resources Management
LME	London Metal Exchange
MMMD	Ministry of Mines and Minerals Development
MoUs	Memoranda of Understanding
NHCC	National Heritage Conservation Commission
NWASCO	National Water Supply and Sanitation Council
PLS	Pregnant Leach Solution
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
RPA	Radiation Protection Authority
RTSA	Road Transport and Safety Agency
SCADA	Supervisory Control and Data Acquisition
SX	Solvent Extraction
SX–EW	Solvent Extraction – Electrowinning
TDS	Total Dissolved Solids
TSP	Total Suspended Particulates
TSF	Tailings Storage Facility

TSS	Total Suspended Solids
WARMA	Water Resources Management Authority
WHO	World Health Organization
ZABS	Zambia Bureau of Standards
ZEMA	Zambia Environmental Management Authority
ZESCO	Zambia Electricity Supply Corporation

1.0 INTRODUCTION

1.1 Company Background

Rongxing Investments Limited was incorporated on 16th August, 2016 and has been operating the Sabina based Processing plant from 2017, in compliance with Zambian laws and regulations. The company plays a key role in Zambia's mining sector by processing copper raw materials into copper cathodes, a critical intermediary product in the copper value chain. Positioned within the mineral-rich Copperbelt region, known for extensive mining and processing activities, Rong Xing Investment Limited contributes to Zambia's efforts to enhance resource value through processing. This activity supports the country's goal of maximizing the economic benefits derived from its natural resources.

1.2 Background of the Project

The project constitutes the expansion and technical renovation for an existing hydrometallurgical copper processing operation comprising Leach Plant 1 and 2, with an additional new raw-material preparation and curing Plant to be constructed on Plot 19. The project is designed to transition the company's focus toward the processing of low-grade tailings and high-bonded copper oxide ores. By implementing advanced maturation (curing) and thickening technologies, the facility will increase its production capacity from the current 24.6 tons/day to a target of 56 tons of cathode copper per day (approximately 18,500 tons per annum).

This expansion responds to two regional realities:

- Declining availability of high-grade oxide ore, and
- Vast, underutilized deposits of low-grade tailings and weathered overburden.

The project therefore pivots the facility away from reliance on higher-grade ore inputs and toward a sustainable long-term model based on the beneficiation and processing of low-grade copper-bearing tailings. To achieve this, the project incorporates technological upgrades in grinding, screening, acid curing, leaching, solid–liquid separation, solvent extraction (SX), and electrowinning (EW), supported by the construction of a high-capacity raw-material handling and curing facility.

The expanded system is designed around four core transformation objectives:

- Increasing raw material processing to 4,000 tonnes per day through enhanced screening, crushing, and curing capacity.
- Improving leaching efficiency of both tailings and high-bonded oxide ores through modern mechanical agitation, optimized slurry density, and sulfuric acid curing.
- Enhancing SX–EW capacity through flow reconfiguration, increased mixer–settler efficiency, and the expansion of electrolytic cells with upgraded busbar systems.
- Maximizing water and reagent recirculation through a fully integrated counter-current decantation (CCD) and raffinate return system, sustaining operational stability and minimizing environmental discharge.

The modernized facility will rely heavily on closed-loop water recycling, optimized acid utilization, and a highly integrated hydrometallurgical control philosophy, ensuring that the operation remains economically competitive, environmentally compliant, and technologically efficient.

1.3 Summary Description of the Project Including Project Rationale

1.3.1 Project Overview

RongXing Investments Limited proposes the expansion and technical renovation of its existing hydrometallurgical copper processing facility located in Chambishi, Kalulushi District, Copperbelt Province. The project is situated on Subdivision A of Subdivision E of Lot No. L/541/M, within the Chambishi Industrial Area.

The project comprises two core components:

1. Construction of a new front-end raw material preparation and high-pressure acid curing facility on Plot 19, and
2. Expansion and upgrading of existing Leach Plants 1 and 2, including solvent extraction (SX) and electrowinning (EW) systems.

The objective of the expansion is to transition the operation from reliance on higher-grade oxide ores to the processing of low-grade copper tailings and high-bonded/weathered oxide ores, responding to declining high-grade ore availability and the presence of extensive underutilised tailings in the region. Following expansion, processing capacity will increase to approximately 4,000 tonnes of raw material per day, with cathode copper production rising from 24.6 t/day to about 56 t/day, equivalent to ~18,500 t per annum.

New infrastructure on Plot 19 will include an enclosed high-pressure acid curing building with a footprint of approximately 6,000 m² (200 m × 30 m × 7 m), designed for 5–7 day curing cycles and 6 m stockpile heights. Supporting systems will comprise relocated wet screening units, new impact crushers producing a target particle size of ~5 mm, agglomeration and mixing equipment, slurry preparation facilities, and a high-rate thickener achieving approximately 90% washing efficiency for pregnant leach solution (PLS) recovery.

The upgraded process will remain a fully integrated hydrometallurgical flowsheet, including crushing and screening, controlled acid curing, mechanically agitated leaching, counter-current decantation (CCD), solvent extraction, and electrowinning. SX circuits in Plants 1 and 2 will be reconfigured to handle solution flows of up to 600 m³/h, with additional extraction and stripping stages, enlarged mixer–settlers, and upgraded impellers. Electrowinning capacity will be expanded to 60 cells in Plant 1 and 50 cells in Plant 2, powered by rectifiers rated at 20,000 A / 90 V and 22,000 A / 125 V,

producing 99.99% purity LME-grade cathode copper.

Primary raw materials will consist of low-grade tailings and high-bonded oxide ores with copper grades typically ranging from 0.4% to 1.0% Cu. Key reagents include sulphuric acid for curing and leaching, SX organic extractants with kerosene diluents, and auxiliary oils and lubricants. Process water will be managed through a closed-loop system, utilising recycled thickener overflow and tailings return water, with limited fresh water supplementation to maintain water balance.

To convey PLS across the railway separating Plot 19 from existing plants, the project will install an above-rail pipebridge carrying corrosion-resistant pipelines with leak detection and containment features. This configuration ensures safe, continuous transfer while avoiding subsurface construction risks.

The project will be implemented through site preparation, construction, commissioning, operation, and eventual decommissioning phases. The anticipated operational life is approximately 15 years.

1.3.2 Project rationale

The RongXing expansion project is driven by the need to sustain and improve copper production in the Copperbelt in the face of declining availability of high-grade oxide ores. Large volumes of low-grade tailings and weathered oxide ores remain underutilised in the region, yet still contain recoverable copper that can be economically processed using modern hydrometallurgical techniques.

By expanding and technically renovating its existing facilities, RongXing will increase production efficiency and output while reducing reliance on new mining areas. The project promotes resource efficiency and waste reduction by recovering copper from materials that would otherwise remain as environmental liabilities.

The project also aligns with national development objectives by supporting value addition within Zambia, creating employment, strengthening local supply chains, and increasing government revenue through taxes and royalties. Through improved technology, water recycling, and environmental controls, the project offers a sustainable and responsible approach to copper processing that balances economic growth with environmental and social protection.

1.4 Objectives of the Project

The overall objective of the RongXing Investments Limited project is to expand and technically renovate the existing hydrometallurgical copper processing facility in order to improve operational efficiency, enhance copper recovery from low-grade materials, and ensure long-term environmental and economic sustainability.

The specific objectives of the project are to:

1. **Increase Copper Production Capacity**
   To raise cathode copper production from the current levels to approximately 56 tonnes per day (about 18,500 tonnes per annum) through the expansion of leaching, solvent extraction, and electrowinning (SX–EW) systems.
2. **Enhance Processing of Low-Grade Tailings and Oxide Ores**
   To transition the operation from reliance on higher-grade oxide ores to the beneficiation of low-grade tailings, weathered overburden, and high-bonded copper oxide ores, thereby extending the life of the operation and improving resource utilisation.
3. **Improve Metallurgical Efficiency and Recovery**
   To enhance copper recovery through the introduction of high-pressure acid curing, improved screening and crushing, optimised agitation leaching, and upgraded solid–liquid separation, resulting in higher recovery rates and reduced residual waste.
4. **Reduce Waste Generation and Environmental Liabilities**
   To minimise ore wastage, sulfuric acid over-consumption, and raffinate losses by implementing controlled feed preparation, precise reagent dosing, and closed-loop process solution management.
5. **Upgrade and Modernise Existing Infrastructure**
   To undertake targeted technical renovation of existing Plant 1 and Plant 2, including SX circuit reconfiguration, expansion of electrowinning cells, rectifier upgrades, and improved automation and control systems.

6. **Support Socio-Economic Development**

   To contribute to local and national socio-economic development through job creation, skills and technology transfer, local procurement, and increased fiscal contributions to government revenues.

1.5 Brief Description of the Location

The proposed project site by Rong Xing Investment Limited, is located on Subdivision A of Subdivision E of Lot No. L/541/M within the Chambishi in Kalulushi, Copperbelt Province. Situated 4 kilometres north of the Kitwe-Chingola Sabina Road junction and 2.07 km north-west of the Kitwe-Mufulira Road, the site benefits from direct access to major transport corridors, ensuring logistical efficiency for material and personnel movement. For those traversing from Kitwe's central business district (CBD), the site lies a mere 20 kilometres away and approximately 18.40 km south-west from Mufulira's central business district (CBD). Key landmarks in proximity include Lifesong Twalima Farm, positioned 2.04 km south-east of the plant, and Luongo SDA Church, located approximately 1.5 km east of the plant. The Sabina Central Police checkpoint, situated 3.5 km south the screening plant, provides essential security services to the area. Industrially, the plant is strategically positioned 7.07 km south-east of the NFC Africa Copper Mine, a major copper production facility, underscoring the region's focus on mining and mineral processing. This location capitalizes on the industrial synergy of the Chambishi Industrial Area, including proximity to the Chambishi Copper Smelter (CCS), ensuring operational efficiency and alignment with Zambia's copper production ecosystem.

Current State of the Environment

The current state of the environment at Plot 19 is characterized by a largely open and level terrain with minimal existing infrastructure, situated adjacent to Leach Plant 2 and across the railway line. The site exhibits sparse natural vegetation, primarily grasses and scattered shrubs, with no significant water bodies, wetlands, or sensitive ecological habitats present within the footprint. The area is industrially zoned, with low socio-economic activity and no permanent residential settlements, although local communities may access the land for farming and other informal purposes. Its proximity to existing processing infrastructure and basic access roads provides strategic advantage for integration with the planned 4,000 t/day wet screening and slurry preparation facility, while minimizing potential environmental constraints related to flora, fauna, water resources, or community disruption.

Table 4 Geographic Coordinates of the proposed project

POINTS	LATITUDE	LONGITUDE
A	12°41'12.37"S	28° 7'25.29"E
B	12°41'10.88"S	28° 7'28.63"E
C	12°41'1.72"S	28° 7'24.25"E
D	12°41'3.59"S	28° 7'20.63"E
Leach Plants Coordinates		
Leach Plant 1	12°41'44.03"S	28° 7'29.49"E
Leach Plant 2	12°41'17.22"S	28° 7'21.74"E

1.6 Particulars of Shareholders/Directors

The tables below present the shareholders and directors of Rongxing Investments Limited.

Table 5 Shareholders and Directors

Shareholding Structure

Business Entities

Present forenames and surnames	Nationality	Physical Address	Position	Shares (%)
SHANHAI XUNKUANG	**CHINA**	Shanghai Putuo District North Zhongshan Road No. 2438 Zhongrui Business Building 13th floor Broom Shanghai, xunkuang, CHINA	Company	1%
YUNNAN JINXUN	**CHINA**	Huijin Building A, Floor 25, No.1666 of Haiyuan road North Kunming city, Yunnan Jinxun	Company	99%

Individuals

Present forenames and surnames	Nationality	Identity Type	Identity Number	Director / Partner	Secretary	Shareholder / Member	Shares (%)
Yuan Liming	China	Passport	EJ5427690	Yes			
Zhou Xiong	China	Passport	EP1776777	Yes			
Sosa Mwaba	Zambia	National ID	312319/66/1		Yes		

1.7 Details of the Contact Person/Developer's Physical Address

Developer's Details:

Name: Rong Xing Investment Limited

Physical Address: Subdivision A of Subdivision E of Lot No. L/542/M, Chambishi, Kalulushi, Copperbelt Province.

Details of the Contact Person

Name: Mr. Humphrey Songwe

Designation: Human Resources & Administration Manager

Phone: 0968435314 / 0955685954

E-mail: humphreysongwe@yahoo.com

1.8 Track Record/Previous Experience

Directors of Rong Xing Investments Ltd have vast experience in businesses ranging from mining and metallurgical processes for over 20 years both in China and Zambia. The company was incorporated on 16th August, 2016 and has been operating the Sabina based processing plant from 2017, which it in compliance with Zambian laws and regulations. The company plays a key role in Zambia's mining sector by processing copper raw materials into copper cathodes, a critical intermediary product in the copper value chain. Positioned within the mineral-rich Copperbelt region, known for extensive mining and smelting activities, Rong Xing Investment contributes to Zambia's efforts to enhance resource value through processing. This activity supports the country's goal of maximizing the economic benefits derived from its natural resources.

1.9 Total Project Cost/Investment

The project investment cost is estimated at $8 million dollars.

1.10 Proposed Project Implementation Date

Rongxing Investments Limited estimated that the lifespan of the proposed project will follow the Processing Plant's lifespan which is approximately 15 years from the time it starts its production. It is anticipated that the project shall start by August 2026.

Table 6 Project Schedule

Activity / Phase	Dec 2025	Jan 2026	Feb 2026	March-May 2026	June - August 2026	Sept 2026	October 2026	Year 2041
1. ZEMA Approval								
2. Preparation Phase								
3. Modification of Structures								
4. Construction and Installation of structures								
5. Commissioning								
6. Operational Phase								
7. Decommissioning Phase								

2.0 POLICY, INSTITUTIONAL AND ORGANISATIONAL FRAMEWORK

This section outlines the policy, legal, institutional, and organisational context within which the proposed RongXing Investments Limited project will be implemented. The project will be developed in compliance with relevant national policies, legislation, regulatory requirements, and institutional mandates governing environmental management, mining operations, occupational health and safety, and social protection in Zambia.

2.1 Policy Framework

2.1.1 National Environmental Policy

The Government has developed a National Policy on Environment to avoid conflict of interest, harmonize sectoral strategies, and rationalize legislation that concerns the use and management of the environment to attain an integrated approach to development through a national cross-cutting consensus. The National Policy on Environment was developed to safeguard the environment and to ensure the sustainable use of natural resources. The primary purpose of the policy is "to create an umbrella policy for the welfare of the Nation's environment so that socio-economic development will be achieved effectively without damaging the integrity of the environment or its resources" (Ministry of Tourism, Environment and Natural Resources, 2007).

The Policy expects to achieve increased economic growth that is not damaging to the environment and natural resources. The policy recognizes the need to develop and promote alternative energy sources to fuel-wood and technologies to reduce the use of fuel-wood and enhance carbon-sinks. The Policy provides strategic guidance on vital economic sectors related to the environment, including the Forestry sector where attention is given to the promotion of alternative energy sources, the sustainable use of forest resources and the building of capacities for local communities (Ministry of Tourism, Environment and Natural Resources, 2007).

Relevance: The National Environmental Policy emphasizes sustainable development by balancing economic growth with environmental protection. Rong Xing’s project, involving ore screening and sulfuric acid storage, poses risks of dust emissions, acid spills, and habitat disruption, making alignment with this policy critical to minimize ecological harm.

Compliance: The project will adhere to the policy by implementing dust suppression systems (e.g., water sprays and enclosed conveyors), constructing acid-resistant bund walls to contain spills, and conducting regular environmental audits to ensure sustainable operations.

2.1.2 National Mining Policy

The policy aims to encourage private investment in exploration and development of mining and downstream processing in projects such as the proposed RongXing Investments Limited 's Maposa project. One specifically environmental policy objective is to reduce the danger of ecological damage arising from mining operations as well as damage on the health of workers and inhabitants of the neighborhood through air, water and land. This will be done through new and existing legislation. Environmental concerns are currently addressed by Statutory Instrument No. 28 (1997), Environmental Impact Assessment Regulations, enacted under the provisions of the Environmental Protection and Pollution Control Act of 1990 (Ministry of Mines, Energy and Water Development, 2013).

The Mines and Minerals Development Act No. 11 of 2015 provide for the granting of mining rights, prospecting, mining, disposal of minerals, conservation and protection of air, water, soil, flora, fisheries and scenic attractions in or on the land over which the mining right is sought. It also provides for EIA, air quality and emission standards, storage, handling and processing of hazardous materials, and regulates mine dumps. Specific guidelines for environmental protection in mining operations are contained in Statutory Instrument No. 29 (1997), also called the Mines and Minerals (Environmental) Regulations of 1997 and enacted under the Mines and Minerals Act of 1995 (Ministry of Mines, Energy and Water Development, 2013).

Relevance: This policy promotes private-sector mining investments while safeguarding ecosystems. The Rongxing Hydrometallurgical Copper Processing Facilityenhances copper recovery efficiency, aligning with the policy's goal of optimizing mineral processing, but requires strict compliance to avoid ecological damage.

Compliance: Rong Xing will obtain ZEMA-approved permits, follow Mines Safety Department guidelines for machinery operations, and ensure acid storage complies with Statutory Instrument No. 29 (1997) on mining-related environmental regulations.

2.1.3 National Water Policy

Water plays a cardinal role in socio-economic development and it is fundamental for sustaining all forms of life. Productive activities ranging from agriculture, mining, tourism and other industries are dependent on water. However, Zambia's water resources are yet to be fully exploited for the benefit of its people to enhance their productive ability for improved livelihood (Ministry of Energy and Water Development, 2010).

The National Water Policy of 2010 aims to promote a sustainable water resources development to facilitate an equitable provision of adequate quantity and quality of water for all competing groups of users at acceptable costs and ensure the security of supply under varying conditions. This entails establishing a well-defined institutional structure that will achieve the intended policy objectives (Ministry of Energy and Water Development, 2010).

Relevance: The policy protects water resources from industrial pollution. Sulfuric acid storage poses contamination risks to groundwater and nearby water bodies, necessitating strict spill prevention measures.

Compliance: The project will install geomembrane-lined bunds, emergency sumps for spill recovery, and obtain WARMA permits for water usage and discharge. Acid-neutralization protocols will prevent contaminated runoff.

2.2 Legal Framework

2.2.1 Environmental Management Act, 2011

The EMA Act is the principal act governing and regulating environmental issues in Zambia and provides specific regulations for discharge, collection, storage, transportation and disposal of gaseous, liquid and solid waste. Its main functions include the protection of the environment and control of pollution. It provides for the health and welfare of people, animals, plants and the environment.

ZEMA recently introduced the Statutory Instrument No 65 of 2018 – Extended Producer Responsibility (EPR) Regulations aimed at managing wastes. The EPR regulations require a person whose activities generate waste with the potential to pollute the environment to employ measures essential to minimise waste through treatment, re-use or recycling. Packaging materials and products regulated under regulations are cartons, non-returnable glass and plastic bottles, plastic carrier and flat bags, beverage cans, waste oils and lubricant containers, used lead acid batteries, pesticides and chemical containers and expired chemicals. Others are used-tyres etc. It bans the use, manufacture, trading, retail, importation and commercial distribution of plastic carrier bags and plastic flat bags that are below 30 microns in thickness (Environmental Management Act, 2011).

Relevance: The Act mandates environmental impact assessments (EIAs) and pollution control for industrial projects. The Expansion and Technical Renovation of Rongxing Hydrometallurgical Copper Processing Facility, with risks of environmental pollution, fall under its regulatory scope.

Compliance: An ESIA will be submitted to ZEMA, and operations will include real-time air quality monitoring, acid spill containment systems, and adherence to Extended Producer Responsibility (EPR) Regulations for waste disposal.

2.2.2 Mines and Minerals Development Act No. 29, 2022

Mines and Minerals Development (Amendment) Act, 2022. This Act consisting of two Sections, amends Section 89 of the principal Act by changing the mineral royalty payable for copper produced or recoverable under the licence. The royalty rate is applied at an incremental value in each price range.

This Act describes the administration of the mining industry through the Ministry of Mines. The MMDA discusses the Geological Survey Department, the Department of Mines Safety and the Mining

Advisory Committee. The MMDA outlines the different mining permits that can be obtained, e.g. exploration or mine licenses, small or large- scale gemstone licenses, artisanal licenses and the application requirements for each. The MMDA describes mining royalties and taxes as well as the requirements for a mineral processing License (Mines and Minerals Development Act, 2015).

Relevant mining subsidiary legislation was developed in the 1990s to ensure that environmental management practices were carried out within the industry for old, existing and new projects as part of the old Mines and Minerals Act (repealed by the MMDA, 2008).

Below are other subsidiary legislation that are relevant to the proposed Project: -

- Statutory Instrument No. 29 of 1997 Mines and Minerals (Environmental) Regulations – forms the framework for conducting and reviewing environmental impact assessments for the mining sector. It also provides regulations for auditing project implementation; and
- Statutory Instrument No 102 of 1998 Mines and Minerals Environmental Protection Fund Regulations – provides the mechanism of setting up and operating the Environmental Protection Fund.

Relevance: This Act governs all mining and mineral processing activities in Zambia, making it directly applicable to the Expansion and Technical Renovation of Rongxing Hydrometallurgical Copper Processing Facility. It mandates environmental protection measures, worker safety protocols, and proper licensing for mineral processing operations. The Act's provisions on waste management and pollution control are particularly relevant, as the screening process generates fine ore dust, and sulfuric acid storage poses chemical hazards.

Compliance: The project will secure all required mining and processing licenses from the Ministry of Mines and Minerals Development. An Environmental and Social Impact Assessment (ESIA) will be submitted to ZEMA for approval, as stipulated under the Act. To mitigate risks, the plant will incorporate enclosed screening units and dust collection systems, while acid storage will follow strict containment protocols, including bund walls and neutralization pits. Regular inspections will ensure compliance with the Act's safety and environmental standards.

2.2.3 The Pneumoconiosis Act (No. 13 of 1994)

The Act provides for the requirement for Certificates of Fitness for all mine employees that work in restricted mine areas – working places where free silica in the respirable dust with a particle size less than 5 microns is harmful to humans if inhaled over some time (The Pneumoconiosis Act, 1994).

Relevance: Section 34 of the Act provides that any person who (a) employs as a miner any person who is not the subject of a valid certificate of fitness; or (b) employs as a miner any person who is the subject of an initial (restricted) certificate or a periodical (restricted) certificate otherwise than in accordance with the restrictions set out in such certificate; or (c) employs as a miner any person who is the subject of a special certificate for more than an aggregate of one hundred hours in any period of thirty days; or (d) works as a miner without being the subject of a valid certificate of fitness; or (e) being the subject of an initial (restricted) certificate or periodical (restricted) certificate, works as a miner otherwise than in accordance with the restrictions set out in such certificate; or

(f) being the subject of a special certificate, works as a miner for more than an aggregate of one hundred hours in any period of thirty days; shall be guilty of an offence: No employment without, or in breach of, a certificate of fitness Provided that when a miner is or is to be presented for examination under section forty-one, the continuation of his working or employment as a miner up to fifteen days or for such longer period as the Bureau may authorise in writing with reference to him, after the validity of his certificate of fitness has expired, shall not constitute an offence against the provisions of this Act.

Compliance: RongXing Investments Limited subjects all its works through the process for fitness certification. All workers will be subjected to mandatory examination in line with the act.

2.2.4 Water Resource Management Act of 2011

The Act defines the functions and powers; provide for the management, development, conservation, protection and prevention of water resources and its ecosystem. It also provides for the equitable, reasonable and sustainable utilisation of water resources (Water Resource Management Act, 2011).

Relevance: The Act protects water resources from industrial pollution. Sulfuric acid storage poses contamination risks to groundwater and nearby water bodies, necessitating strict spill prevention measures.

Compliance: The project will install geomembrane-lined bunds, emergency sumps for spill recovery, and obtain WARMA permits for water usage and discharge. Acid-neutralization protocols will prevent contaminated runoff.

2.2.5 Agricultural Lands Act, Cap. 187 (No. 57 of 1960)

The act was passed for the protection and alienation of land for agricultural purposes. This may be applicable during the relocation of some small-scale farmers (Agricultural Lands Act, 1995).

Relevance: The Act provides for the leasing and acquisition of agricultural land from the state land within Zambia. Part II of the Act provides for the Agricultural Lands Board while Part III provides for the process of alienation of the agricultural land in Zambia.

The proposed project is in a customary land tenure system.

Compliance: If the project is not appropriately managed it has the potential impact on some agricultural areas in the area. RongXing Investments Limited, the Local Authority will work together with the Ministry of Agriculture to ensure that the provisions of the Act are observed.

2.2.6 Public Health Cap. 295 Act No. 22 of 1995

The Act provides for the prevention and suppression of diseases and generally to regulate all matters connected with public health in Zambia. The Local Authority of any area is empowered by the Act to do and provide all such acts, issues and things as may be necessary for mitigating any disease, or aiding in the execution of regulations, or for executing the same, as the case may require. The duties of Local Authorities include maintenance of cleanliness and prevention of nuisances including those arising from unsuitable dwellings. Some annoyances are foul, overcrowded, dilapidated, poorly lit, poorly ventilated and poorly constructed houses or premises, street, ditch, gutter, water tank, soil-pipe, waste-pipe, drain, sewer, garbage receptacle, and dustbin. Other nuisances are water sources and reservoirs whose water is polluted but is used for drinking, domestic purposes and preparation of food, and any harmful matter, or wastewater, flowing or discharged from any premises into any public street, gutter, drainage channel, or water-course not approved for the reception of such discharge. The last nuisances under the Act are accumulation or deposit of refuse, offal, manure or other matter and any premises or accumulation of stones, timber, or other building material which is likely to harbour rats or other vermin and a chimney sending forth smoke in such quantity or in such a manner as to be

offensive, injurious or dangerous to health. Another provision deals with infected persons who care for children or handle food utensils or food intended for consumption. The Act provides

for both notification and relocation of cemeteries or human skeletal remains. Should such a need arise in the operation of activities. The developer will have to construct and operated according to the stipulations of the Act especially in terms of graves, and disease prevention and control due to the reservoir. All solid waste from construction activities will have to be collected, conveyed and disposed of in a manner that meets the requirements of the Act (Public Health Act CAP 295, n.d.).

Relevance: The Act prohibits industrial activities that endanger public health. Dust from screening and acid fumes could harm nearby communities if uncontrolled.

Compliance: Dust suppression systems, noise barriers, and acid fume scrubbers will mitigate public health risks. The project will coordinate with Kalulushi District Council to address community concerns.

2.2.7 The Local Government Act No.2 of 2019

The Act provides for the establishment of Councils in districts which function as Local Authorities. The Act defines the functions of Local Authorities. Some of their tasks related to control of the development, use of land and buildings, erection of structures, conservation of natural resources, prevention of soil erosion, protection of life, property and natural resources from age by fire, control of grass weeds and wild vegetation, and maintenance of environmental health services. Other functions include oversight of the storage, sale and use of petroleum, extermination of insects, rodents and snakes, dealing with all kinds of refuse and effluent, controlling the provision of drains and sewers, and conservation and the prevention of the pollution of supplies of water (Local Government Act CAP 281, n.d.).

Relevance: Part II of the Act provides for the establishment of the councils within Zambia, while Part III provides for the functions of the local authorities. Section 17 of the Act shows that the local authorities are the agents of the government in delivering development within the areas of their jurisdiction. The project is in Chambishi Kalulushi district under the auspices of Kalulushi district Council created through the Local Government Act.

Compliance: The project will be implemented in line with the provisions of the Local Government Act aiming at easing the operational challenges of the newly created local authority. Rong Xing Investments Limited will, therefore, coordinate with the council in ensuring that the project is implemented in line with the mandate of the council.

2.2.8 Urban and Regional Planning Act No. 3 of 2015

The Act provides for development, planning and administration principles, standards and requirements for urban and regional planning processes and systems. The Act also ensures sustainable urban and rural development by promoting environmental, social and economic sustainability in development initiatives and controls at all levels of urban and regional planning. The developer must ensure that construction is approved according to the provisions of the Act (Urban and Regional Planning Act, 2015).

Relevance: Section 3 (c) of the Act provides the principal physical, economic, environmental and social characteristics that must be included by the regional planning authorities appointed by the Minister. Section 19 (4) (e) also provides for environmental management, protection of ecologically sensitive areas, heritage and cultural sites as some of the key issues for consideration in developmental planning.

Compliance: Provisions of the Act have been taken into consideration for sustainable planning in the area.

2.2.9 The Land Act and Land Acquisition Act No. 2 of 1970

The Land Act of 1995 was enacted to guarantee peoples' right to land while enhancing development. The Act recognises the holding of land under customary tenure and the Chief's role has been legally recognised, such that land cannot be converted or alienated without the approval of the chief.

Land acquisition is governed by the Lands Acquisition Act No. 2 of 1970. The Act sets out regulations for the compulsory purchase of land and property and compensation for such purchase. The president (his designated and authorised person) may acquire any property in the interest of the Republic. The notice shall be given in person not less than two months in advance and shall be gazetted.

Compensation for acquired property, losses and damages shall be paid as may be agreed or, finally determined by the National Assembly in case agreement on compensation is not reached within six

weeks after publication in the Gazette. Any disputes except for disputes related to the amount of compensation may be instituted for court proceedings. The Act also provides for compensation to be granted by the allocation of new land to the property owner.

The Act instituted a Compensation Advisory Board to advise the Minister of Lands in the assessment of compensation payable under the Act. The functions of the Board have been delegated to various committees. Various forms to be used in proceedings of property acquisition are prescribed in the Statutory Instrument No. 60 of 1970 (The Land Act and Land Acquisition Act, n.d.).

Relevance: The project site in Chambishi Industrial Area requires proper land tenure documentation and may involve compensation procedures if land acquisition affects existing rights holders. The Act governs all land alienation processes in Zambia, including industrial land allocation.

Compliance: Rong Xing will verify all land ownership documents with the Ministry of Lands and ensure proper procedures are followed for any required land conversion from customary tenure. The company will engage with local authorities and traditional leaders to address any land compensation claims transparently

2.2.10 National Heritage Conservation Commission Act No. 13 of 1994

The National Heritage Conservation Commission (NHCC) is established under the National Heritage Conservation Commission Act. The functions of the Commission are to conserve the historical, natural and cultural heritage of Zambia by preservation, restoration, rehabilitation, reconstruction, adaptive use, good management, or any other means. The project sites will have to be investigated for any historical, natural and cultural heritage. According to the Act, if anything is found relating to any heritage during construction, it must be reported to the Commission. The project will, in such a case, give access to the Commission who is empowered by the Act to enter upon and inspect any heritage excavation for investigation, preservation, repair, or restoration of any heritage (National Heritage Conservation Act, n.d.).

Relevance: Industrial development in the Copperbelt region may potentially impact areas of archaeological or cultural significance. The Act protects Zambia's cultural heritage and requires assessment of project sites for such heritage resources.

Compliance: Prior to construction, a heritage impact assessment will be conducted in consultation with NHCC. Should any cultural artifacts be discovered during earthworks, work will be immediately halted and NHCC notified for proper preservation measures

2.2.11 Forest Act No 4 of 2015

The Act concerns the management and conservation of forest resources and, to some extent, the protection of biological diversity and generally the environment in Zambia. The Act provides for the establishment and declaration of National Forests, Local Forests, joint forest management areas, botanical reserves, private forests and community forests; provide for the participation of local communities, local authorities, traditional institutions, non-governmental organisations and other stakeholders in sustainable forest management; provide for the conservation and use of forests and trees for the sustainable management of forests ecosystems and biological diversity; establish the Forest Development Fund; provide for the implementation of the United Nations Framework Convention on Climate Change, Convention on International Trade in Endangered Species of Wild Flora and Fauna, the Convention on Wetlands of International Importance, especially as Water Fowl Habitat, the Convention on Biological Diversity, the Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa and any other relevant international agreement to which Zambia is a party; repeal and replace the Forests Act, 1999 (Forest Act, 2015).

Relevance: While the project site is in an industrial area, there may be residual vegetation that requires proper management. The Act regulates forest conservation and sustainable use of forest resources.

Compliance: Any necessary vegetation clearance will be minimized and conducted with approval from the Forestry Department. The project will implement compensatory tree planting where feasible and maintain existing green buffers around the facility.

2.2.12 Occupational Health and Safety Act No. 36 of 2010

The Act to establish the Occupational Health and Safety Institute and provide for its functions. Provide for the establishment of health and safety committees at workplaces and for the health, safety and welfare of persons at work; provide for the duties of manufacturers, importers and suppliers of articles, devices, items and substances for use at work; provide for 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; and provide for matters connected to events at work (Occupational Health and Safety Act, 2010).

Relevance: The Act ensures worker safety in hazardous environments. Sulfuric acid handling and machinery operations at the Rongxing Hydrometallurgical Copper Processing Facility expose workers to chemical burns, respiratory hazards, and physical injuries.

Compliance: Safety protocols include mandatory PPE (acid-resistant gloves, respirators), emergency showers, and training programs for spill response. A health and safety committee will oversee compliance.

2.2.13 Workers Compensation Act of 1999

The Act for the law relating to the compensation of workers for disabilities suffered or diseases contracted during employment and providing for the payment of compensation to dependents of workers who die because of accidents or illnesses at workplaces (Workers Compensation Act, 1999).

Relevance: The hazardous nature of ore processing and acid handling operations creates potential workplace injury risks for employees. The Act provides the legal framework for compensation of work-related injuries and illnesses.

Compliance: All employees will be registered with the Workers' Compensation Fund. The company will maintain proper records of workplace incidents and ensure prompt reporting and processing of any compensation claims.

2.2.14 The Employment Code Act No 3 of 2019

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, have been repealed and replaced with "The Employment Code Act No. 3 of 2019.

The Act to provide legislation relating to the employment of persons; to make provision for the engagement of persons on contracts of service and to provide for the form of an enforcement of agreements of service; to make provision for the appointment of officers of the Labour Department and for the conferring of powers on such officers and upon medical officers; to make provision for the protection of wages of employees; to provide for the control of employment agencies (Employment Act, n.d.).

Relevance: The project will create numerous employment opportunities during both construction and operational phases. The Act governs all aspects of employment relationships in Zambia.

Compliance: Rong Xing will ensure all employment contracts meet statutory requirements regarding wages, working hours, leave entitlements, and termination procedures. Special attention will be given to occupational categories and non-discrimination provisions

2.2.15 Public Roads (Amendment) Act, 2022

The Act establishes the Road Development Agency which is mandated to coordinate the national road network, conduct traffic studies as well as provide guidance, recommendations and technical assistance to the national government. This Act also sets construction standards like widths and design and also designates maintenance powers to various government agencies to control construction, traffic signals, and acceptable weight of vehicles. Finally, the First Schedule contains provision with regards to the administration and financial provisions of the Agency whereas the Second and Third Schedule relates to provisions for the Roads Department and the list of inter- territorial main roads respectively.

Relevance: The transportation of sulfuric acid and processed materials will involve heavy vehicle movements on public roads. The Act sets standards for road use and maintenance.

Compliance: All project vehicles will comply with axle load limits and obtain necessary road permits. The company will contribute to road maintenance as required and ensure safe routing of hazardous material transports.

2.2.16 The Road Traffic Act, No. 8 of 2022

The Road Traffic Act No. 8 of 2022 was enacted to cover issues of road safety in Zambia. The Act provides for the establishment of the Road Transport and Safety Agency (RTSA) and defines its core mandate. The Act also provides for road safety and traffic management in Zambia.

Cited Section: Introductory section.

Relevance: Safe transportation of hazardous materials like sulfuric acid requires strict adherence to road safety regulations. The Act provides the legal framework for road safety management.

Compliance: Acid transport vehicles will have proper hazardous material placarding, trained drivers with special licenses, and comply with all RTSA regulations for dangerous goods transportation

2.2.17 The Fisheries Act No 22 of 2011

An Act to provide for the appointment of the Director of Fisheries and fisheries officers and provide for their powers and functions; promote the sustainable development of fisheries and a precautionary approach in fisheries management, conservation, utilisation and development; establish fisheries management areas and fisheries management committees; provide for the regulation of commercial fishing and aquaculture; establish the Fisheries and Aquacuture Development Fund; repeal and replace the Fisheries Act, 1974; and provide for matters connected with, or incidental to, the foregoing

Relevance: While primarily an industrial project, potential acid spills could impact aquatic ecosystems in the region. The Act protects fisheries resources from industrial pollution.

Compliance: The project's spill containment systems will be designed to prevent any contamination of water bodies that could affect fish habitats. Regular monitoring of nearby water quality will be conducted.

2.2.18 Water Supply and Sanitation Act No. 28 of 1997

The Act to establish the National Water Supply and Sanitation Council and define its functions; to provide for the establishment, by local authorities, of water supply and sanitation utilities; to provide for the efficient and sustainable supply of water and sanitation services under the general regulation of the National Water Supply and Sanitation Council; and to provide for matters connected with or incidental to the foregoing.

Relevance: The project requires reliable water supply for dust suppression and worker sanitation needs. The Act regulates water services provision.

Compliance: The company will obtain proper water use permits and ensure all sanitation facilities for workers meet NWASCO standards. Wastewater from operations will be properly treated before disposal

2.2.19 Electricity Act No. 11 of 2019

An Act to regulate the generation, transmission, distribution and supply of electricity; and to provide for matters connected with or incidental to the foregoing.

Relevance: The Rongxing Hydrometallurgical Copper Processing Facility and ancillary facilities will require significant electrical power. The Act governs electricity generation, transmission and distribution.

Compliance: All electrical installations will be done by licensed contractors and inspected by ZESCO. Backup power systems will be installed to ensure safe shutdown procedures in case of power failures.

2.2.20 Energy Regulation Act No. 12 of 2019

An Act to establish an Energy Regulation Board and to define its functions and powers; a to provide for the licensing of undertakings to produce energy or the production or handling of certain fuels; a to repeal the National Energy Council Act and the Zambia Electricity Supply Act.

Relevance: Part II of the Act (Section 3 to Section 7) provides for the establishment of the Energy Regulations Board. Part III provides for the licensing of energy related undertakings through the ERB. RongXing Investments Limited will need to produce its own electricity to ensure smooth operations using generators.

Compliance: RongXing Investments Limited will operate the onsite generators and handle fuels in line with the Act.

2.2.21 The Ionising Radiation Protection (Amendment) Act, 2011

The Ionising Radiation Protection (Amendment) Act, 2011, and shall be read as one with the Ionising Radiation Protection Act, 2005 provides for the regulation of all ionising radiation sources within Zambia. The Act also establishes the Radiation Protection Authority (RPA). The Act provides for the protection of the public, workers and the environment from hazards generated using devices or proximity to materials that produce ionising radiation. The Act provides for the protection of the public, workers and the environment from hazards generated using devices or proximity to materials that produce ionising radiation.

The roles of the RPA are: -

- Promote safety, health and the protection of the environment;
- Implement the IRP Act and ensure compliance from licensees;
- Conduct all licensing of ionising radiation devices, sources or activities;
- Conduct audits of facilities and staff monitoring as required during licensing; and
- Provide educational material, workshops and programs to improve public awareness and understanding of ionising radiation.

Relevance: While not a nuclear facility, the project may use radiation-based equipment for process monitoring or analysis. The Act regulates all radiation sources in Zambia.

Compliance: Any radiation-emitting equipment will be properly licensed with RPA. Workers operating such equipment will receive special training and dosimetry monitoring where required

2.3 Institutional Framework

2.3.1 Water Resources Management Authority

The Water Resources Management Authority was established under the Water Resource Management Act (Section 2.2.2 above) its functions and powers include; management, development, conservation, protection and preservation of the water resource and its ecosystems; provide for the equitable, reasonable and sustainable utilisation of the water resource; ensuring the right to draw or take water for domestic and non-commercial purposes, and that the poor and vulnerable members of the society have an adequate and sustainable source of water free from any charges; creation of an enabling environment for adaptation to climate change; provision for the constitution, functions and composition of catchment councils, sub-catchment councils and water users associations; provide for international and regional cooperation in, and equitable and sustainable utilisation 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.

2.3.2 Zambia Environmental Management Authority

The Zambia Environmental Management Agency (ZEMA - formally known as the Environmental Council of Zambia) was established under the Environmental Management Act of 2011. The role of the Agency is, amongst other things, to: advise on policy formulation and make recommendations for the sustainable management of the environment; ensure the integration of environmental concerns in overall national planning through coordination with appropriate authorities; review environmental impact assessment (EIA) and strategic environmental assessment (SEA) reports; monitor trends of natural resources, their use and impact on the environment and make necessary recommendations to the appropriate authority; and publicize information on any aspects of the environment and facilitate public access to information on the environment.

The National Conservation Strategy (NCS) was adopted by the Zambian Government in 1985 and is the forerunner to environmental legislation in Zambia. The NCS guided the sustainable development of Zambia through the use and conservation of natural resources within a centrally planned and controlled economy. The NCS led to the enactment of the Environmental Protection and Pollution Control Act (EPPCA) in 1990 and provided for the establishment of the Environmental Council of Zambia (ECZ), which became operational in 1991. The enactment of the Environmental Management Act in 2011 further lead to the change from ECZ to the Zambia Environmental Management Agency (ZEMA).

ZEMA oversees the activities of all industrial, mining, agricultural and service companies that may have environmental and social impacts to minimize and mitigate these impacts. ZEMA requires the development of Environmental Impact Assessments for all new and existing projects. ZEMA is responsible for the collection and dissemination of environmental and social information and for improving the environmental awareness of the public. ZEMA also issues annual licenses with respect to environmental activities e.g. waste management, effluent discharge, gas releases.

2.3.3 Ministry of Mines and Minerals Development

The Zambian Ministry of Mines and Minerals Development (MMMD) is responsible for the management of artisanal, exploration and mining activities through the Department of Mines, Geological Survey Department and Department of Mines Safety. In 2008, the Mines and Minerals Development Act, 2008 was developed and passed by Parliament to repeal the Mines and Minerals Act of 1995.

All administrative activities are now coordinated through Cadastre Offices throughout Zambia, with the Central Mining Cadastre Office located in Lusaka, Zambia. The Mining Advisory Committee (MAC), under section 150 of the 2008 Mines and Minerals Development Act, provides consultation and advice to all the Ministry of Mines Departments in all aspects governed by the implementation of the Act. The ultimate decision for licensing lies with the Directors in the Ministry of Mines.

2.3.4 Water Resources Management Authority

Water Resources Management Authority (WARMA) is a statutory body under the WRM Act No. 21 of 2011 tasked to manage Zambia's water resources effectively. Its primary purpose is to serve as the regulatory body for the management and development of water resources in the whole country and ensure equal access to water for the various stakeholders. Based on the principles of Integrated Water Resources Management (IWRM), WARMA also take gender and climate change dimensions into account to perform the following key organizational functions:

- Ensure the sustainable and rational utilization, management and development of water resources.
- Establish and maintain an integrated water resources management information system that is easily accessible by all users.
- Provide access to water resources of acceptable quality and quantity for various uses.
- Set standards and guidelines for undertaking water resources management and development.
- Provide comprehensive advice to the Minister responsible for water on policies for utilisation, management and development of water resources.

2.3.5 District Administrative Office

The District Administrative Office headed by the district administrator provides government leaders at the district level. The proposed project is under the District Administrative Office.

2.4 International and Regional Conventions

Zambia is a signatory to a number of International and Regional Conventions, the ones which are related to the environment, and which might apply to the proposed project include the following:

- The Ramsar Convention (Formally, the Convention on Wetlands of International Importance especially as a Waterfowl Habitat).
- Convention on Biological Diversity.
- United Nations Framework Convention on Climate Change.

2.4.1 The Ramsar Convention

The Ramsar Convention applies to all wetlands, a transitional area between terrestrial and aquatic systems in which the water table is usually at or near the surface or the land is covered by shallow water. Under the Ramsar Convention, wetlands can include tidal mudflats, natural ponds, marshes, potholes, wet meadows, bogs, peat lands, freshwater swamps, mangroves, shallow lakes, and some rivers.

Cited Section: Section 1.3 of the Ramsar Convention Manual, 6th edition.

Relevance: The Convention protects wetlands from industrial pollution. Acid spills could degrade nearby aquatic ecosystems in the Copperbelt's water-rich region.

Compliance: Secondary containment systems (bund walls, sumps) and regular inspections will prevent acid leakage into wetlands. WARMA will monitor water quality to ensure compliance.

Convention on Biological Diversity

The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, is a multilateral treaty. The Convention has three main goals:

- Conservation of biological diversity (or biodiversity).
- Sustainable use of its components; and
- Fair and equitable sharing of benefits arising from genetic resources.

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

Cited Section: Articles 3 and 6 of the United Nations Convention on Biological Diversity.

Relevance: Industrial development can potentially impact local biodiversity through habitat modification or pollution. The Convention promotes conservation of biological diversity.

Compliance: The project will implement measures to minimize land disturbance and maintain ecological corridors where possible. An environmental management plan will include biodiversity conservation measures.

2.4.2 The United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty (currently the only international climate policy venue with broad legitimacy, due in part to its virtually universal membership) negotiated at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro from 3 to 14 June 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. This is an international agreement which Zambia has ratified aimed at reducing climate change and control of emissions with potential to cause climate change.

Cited Section: Article 2, subsections 1a (i) and 1a (vii).

Relevance: Industrial operations contribute to greenhouse gas emissions through energy use and chemical processes. Zambia is committed to climate change mitigation under this Convention.

Compliance: The project will monitor and report its carbon footprint, implement energy efficiency measures, and explore renewable energy options where feasible to align with Zambia's climate commitments.

3.0 PROJECT DESCRIPTION

3.1 Location

The proposed project site by Rong Xing Investment Limited, is located on Subdivision A of Subdivision E of Lot No. L/541/M within the Chambishi in Kalulushi, Copperbelt Province. Situated 4 kilometres north of the Kitwe-Chingola Sabina Road junction and 2.07 km north-west of the Kitwe-Mufulira Road, the site benefits from direct access to major transport corridors, ensuring logistical efficiency for material and personnel movement. For those traversing from Kitwe's central business district (CBD), the site lies a mere 20 kilometres away and approximately 18.40 km south-west from Mufulira's central business district (CBD). Key landmarks in proximity include Lifesong Twalima Farm, positioned 2.04 km south-east of the plant, and Luongo SDA Church, located approximately 1.5 km east of the plant. The Sabina Central Police checkpoint, situated 3.5 km south the screening plant, provides essential security services to the area. Industrially, the plant is strategically positioned 7.07 km south-east of the NFC Africa Copper Mine, a major copper production facility, underscoring the region's focus on mining and mineral processing. This location capitalizes on the industrial synergy of the Chambishi Industrial Area, including proximity to the Chambishi Copper Smelter (CCS), ensuring operational efficiency and alignment with Zambia's copper production ecosystem.

Current State of the Environment

The current state of the environment at Plot 19 is characterized by a largely open and level terrain with minimal existing infrastructure, situated adjacent to Leach Plant 2 and across the railway line. The site exhibits sparse natural vegetation, primarily grasses and scattered shrubs, with no significant water bodies, wetlands, or sensitive ecological habitats present within the footprint. The area is industrially zoned, with low socio-economic activity and no permanent residential settlements, although local communities may access the land for farming and other informal purposes. Its proximity to existing processing infrastructure and basic access roads provides strategic advantage for integration with the planned 4,000 t/day wet screening and slurry preparation facility, while minimizing potential environmental constraints related to flora, fauna, water resources, or community disruption.

Table 7 Geographic Coordinates of the proposed project

POINTS	LATITUDE	LONGITUDE
A	12°41'12.37"S	28° 7'25.29"E
B	12°41'10.88"S	28° 7'28.63"E
C	12°41'1.72"S	28° 7'24.25"E
D	12°41'3.59"S	28° 7'20.63"E
Leach Plants Coordinates		
Leach Plant 1	12°41'44.03"S	28° 7'29.49"E
Leach Plant 2	12°41'17.22"S	28° 7'21.74"E

Figure 1 Shows the Proposed Project Area at Rongxing Investments Limited.

3.2 Nature of the Project

3.2.1 Project Overview

The project constitutes the expansion and technical renovation for an existing hydrometallurgical copper processing operation comprising Leach Plant 1 and 2, with an additional new raw-material preparation and curing Plant to be constructed on Plot 19. The project is designed to transition the company's focus toward the processing of low-grade tailings and high-bonded copper oxide ores. By implementing advanced maturation (curing) and thickening technologies, the facility will increase its production capacity from the current 24.6 tons/day to a target of 56 tons of cathode copper per day (approximately 18,500 tons per annum).

This expansion responds to two regional realities:

- Declining availability of high-grade oxide ore, and
- Vast, underutilized deposits of low-grade tailings and weathered overburden.

The project therefore pivots the facility away from reliance on higher-grade ore inputs and toward a sustainable long-term model based on the beneficiation and processing of low-grade copper-bearing tailings. To achieve this, the project incorporates technological upgrades in grinding, screening, acid curing, leaching, solid–liquid separation, solvent extraction (SX), and electrowinning (EW), supported by the construction of a high-capacity raw-material handling and curing facility.

The expanded system is designed around four core transformation objectives:

- Increasing raw material processing to 4,000 tonnes per day through enhanced screening, crushing, and curing capacity.
- Improving leaching efficiency of both tailings and high-bonded oxide ores through modern mechanical agitation, optimized slurry density, and sulfuric acid curing.
- Enhancing SX–EW capacity through flow reconfiguration, increased mixer–settler efficiency, and the expansion of electrolytic cells with upgraded busbar systems.
- Maximizing water and reagent recirculation through a fully integrated counter-current decantation (CCD) and raffinate return system, sustaining operational stability and minimizing environmental discharge.

The modernized facility will rely heavily on closed-loop water recycling, optimized acid utilization, and a highly integrated hydrometallurgical control philosophy, ensuring that the operation remains economically competitive, environmentally compliant, and technologically efficient.

Infrastructures to be installed and constructed:

New Plant Construction (Plot 19)

A significant portion of the project involves the construction of a new front-end processing plant on Plot 19 to ensure a consistent metal supply for the recovery circuits.

- **High-Pressure Acid Curing Building:**
  - ✓ **Structure:** A new industrial steel-frame building.
  - ✓ **Footprint:** 6,000 m² (200m length × 30m width × 7m height).
  - ✓ **Operational Capacity:** Configured for a 7-day curing cycle with a 6-meter stockpile height to accommodate 4,000 tons of ore daily.
- **Screening and Crushing Infrastructure:**
  - ✓ Installation of a relocated wet screening line and new impact crushers.
  - ✓ **Target Fineness:** Ore is crushed to approximately 5mm to maximize acid contact.
- **Agglomeration & Mixing Station:**
  - ✓ Installation of a twin-shaft mixer or disc pelletizer for uniform acid/water spraying.
- **Liquid Preparation & Solid-Liquid Separation:**
  - ✓ Construction of a new 4,000-ton/day tailings slurry preparation system.
  - ✓ **Thickener Unit:** Installation of a large-scale high-rate thickener designed for 90% **washing efficiency** to recover Pregnant Leach Solution (PLS).

Existing Facilities to be Renovated

The backend recovery systems in Plant 1 and Plant 2 are being fundamentally redesigned to handle the increased solution flow of 600 m^3/h.

A. Solvent Extraction (SX) Circuit Upgrade

- **Stage Expansion:** Installation of one additional extraction stage and one stripping stage for each plant.
- **Mixer-Settler Specifications:** New settling chambers: 15m x 15m x 1.2m.
  - ✓ New mixing chambers: 3.5m x 3.5m x 3.5m.
- **Agitation:** Upgrading to 2.5m (Plant 2) and 1.8m (Plant 1) impellers to optimize phase mixing.

B. Electrowinning (EW) Facilities Expansion

The project implements a "Rectifier Swap" and a significant increase in electrolytic cells:

- **Plant 1 (Expansion to 60 Cells):**
  - ✓ **Installation:** 40 new electrolytic cells (5.0m x 1.0m x 1.3m).
  - ✓ **Power:** Installation of a 20,000A / 90V rectifier (relocated from Plant 2).
  - ✓ **Target Output:** ~27 tons/day.
- **Plant 2 (Expansion to 50 Cells):**
  - ✓ **Installation:** 16 new electrolytic cells (5.0m x 1.0m x 1.3m).
  - ✓ **Power:** Installation of a new 22,000A / 125V silicon rectifier and transformer.
  - ✓ **Target Output:** ~28.8 tons/day.

3.2.2 Raw Materials

Primary Raw Materials

The primary feed materials for the expanded operation will consist of:

- Low-grade copper tailings, sourced from historical and current tailings storage facilities; and
- High-bonded and weathered copper oxide ores, sourced from local deposits and overburden material.

The feed material is expected to exhibit relatively low copper grades, typically ranging between 0.4% and 1.0% total copper, necessitating enhanced pre-treatment and leaching technologies to achieve viable recovery rates. Daily throughput of raw material will be approximately 4,000 tonnes.

Process Chemicals and Hazardous Materials

Sulphuric Acid (H_2SO_4)

Sulphuric acid is the primary leaching reagent and is used extensively during acid curing, solution conditioning, and copper dissolution. Acid will be stored in purpose-built, acid-resistant storage tanks equipped with secondary containment, leak detection systems, controlled transfer lines, and emergency isolation valves. Automated dosing systems will regulate acid addition to optimize consumption and minimize occupational and environmental risk.

Solvent Extraction Reagents

Organic extractants (LIX-series reagents) and kerosene-based diluents will be used in the SX circuit for selective copper transfer. These reagents will be stored in sealed tanks located within bunded and lined containment areas designed to prevent soil and groundwater contamination and to manage fire risk.

Oils, Lubricants, and Auxiliary Chemicals

Lubricants, hydraulic oils, coolants, and minor process additives used for crushers, agitators, pumps, and electrical systems will be stored in designated hazardous material storage areas fitted with impermeable flooring, spill containment systems, and material safety data sheets (MSDS).

All hazardous materials will be managed in accordance with international industry best practice and applicable Zambian regulatory requirements.

Process Water (Fresh and Recycled)

Process water is a critical raw material for the hydrometallurgical operation and plays a central role in maintaining slurry transport, leaching efficiency, washing performance, and electrolyte stability throughout the processing circuit.

Process water will be used to:

- Maintain optimal slurry density during leaching and agitation;
- Support counter-current washing cycles in the thickener and solid–liquid separation stages;
- Stabilize electrolyte concentration in the solvent extraction and electrowinning circuits; and
- Facilitate material transport, equipment cleaning, and process control.

To minimize freshwater abstraction and reduce environmental impact, the operation is designed around a closed-loop water management system. Primary water sources will include:

- Recycled thickener overflow, returned directly to the leaching and curing circuits;
- Tailings storage facility (TSF) return water, recovered and reused within the process where suitable; and
- Fresh water supplementation, used only as required to maintain water balance, compensate for evaporation and entrainment losses, and support plant start-up or upset conditions.

3.2.3 Process and Technology

The expanded operation will employ a fully integrated hydrometallurgical copper recovery process, optimized for the treatment of low-grade tailings and high-bonded oxide ores.

Raw Material Preparation and Crushing

Feed material delivered to the new preparation plant on Plot 19 will undergo screening and impact crushing to achieve a target particle size of approximately 5 mm. This size specification enhances mineral exposure and improves acid penetration during curing and leaching. A relocated wet screening system and new impact crushers will be installed to ensure consistent feed sizing and effective handling of moisture-rich tailings.

Agglomeration and Acid Curing

Crushed material will be conveyed to an enclosed high-pressure acid curing facility with a footprint of approximately 6,000 m² (200 m × 30 m × 7 m). Using twin-shaft mixers or disc pelletizers, controlled quantities of sulphuric acid and water will be uniformly applied to the material. The agglomerated ore will then be stacked in curing bays and allowed to mature for 5–7 days.

This controlled curing process promotes mineral breakdown, enhances copper solubilization, reduces downstream acid consumption, and improves overall leaching efficiency.

Agitation Leaching

Cured material will be slurried with recycled raffinate and processed in mechanically agitated leach tanks. The upgraded agitation system ensures optimal ore–solution contact, controlled slurry density, and sufficient residence time to achieve efficient copper dissolution from both tailings and high-bonded oxide ores.

Solid–Liquid Separation and Counter-Current Decantation

Leached slurry will be directed to a high-rate thickener forming the core of a counter-current decantation (CCD) system. The thickener is designed to achieve approximately 90% washing efficiency, maximizing recovery of pregnant leach solution (PLS) and minimizing copper losses to tailings. Washed solids will be discharged to the approved tailings storage facility.

Solvent Extraction (SX)

The solvent extraction circuits in Leach Plants 1 and 2 will be extensively upgraded to accommodate increased solution flow rates of up to 600 m³/h. Modifications include the addition of one extraction stage, one stripping stage, organic washing, and enlarged mixer–settler units. Optimized impeller sizes (1.8 m in Plant 1 and 2.5 m in Plant 2) will improve phase mixing and copper mass transfer efficiency when treating low-grade PLS (≈3 g/L Cu).

Electrowinning (EW)

Purified electrolyte from the SX circuit will be processed in expanded electrowinning facilities comprising 60 cells in Plant 1 and 50 cells in Plant 2. Electrical power will be supplied by high-capacity silicon rectifiers rated at 20,000 A / 90 V and 22,000 A / 125 V, supported by upgraded busbar systems. Copper will be deposited onto stainless-steel starter plates, producing 99.99% purity cathode copper.

Water and Reagent Recycling

The entire process is designed around a closed-loop water management philosophy. Thickener overflow, raffinate, and solution bleed streams will be recycled back into curing and leaching circuits, minimizing freshwater abstraction and maintaining process chemistry stability

Material Transportation Method

The project will employ an above-rail pipebridge (overpass) to convey the prepared Pregnant Leach Solution (PLS) and related process streams from Plot 19 to the hydrometallurgical circuits in Plants 2 and 1. This method has been selected due to the physical separation created by the railway and the need for a reliable, controlled, and continuously accessible transfer route.

The pipebridge will consist of a steel truss span constructed across the railway at approved clearance height (typically ≥6.5 m), supported by reinforced concrete pedestals outside the rail corridor. Corrosion-resistant pipelines (HDPE, FRP, or internally lined steel) will be mounted on the bridge with engineered pipe shoes, expansion joints, and isolation valves positioned at both approaches. Drip trays and leak-detection instrumentation will be incorporated to ensure environmental protection and immediate incident response.

This elevated configuration allows safe and uninterrupted movement of PLS from the Plot 19 pump station to Plant 2's receiving tank and, where required, onward to Plant 1. The design provides full visibility for inspection, simplifies maintenance, and avoids subsurface construction risks associated with horizontal drilling beneath active rail infrastructure.

Figure 2 Flow Diagram of the curing facility Process

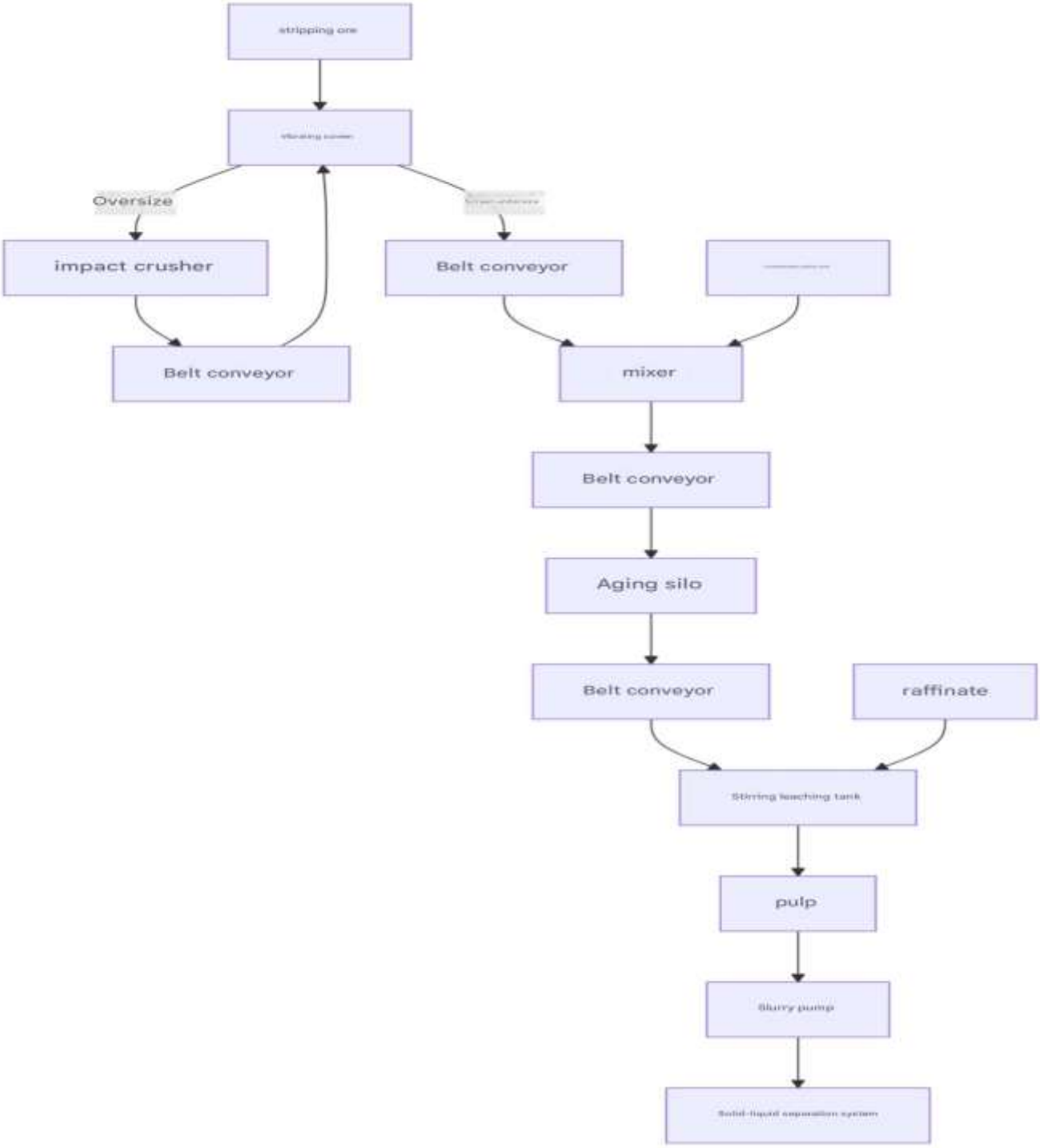
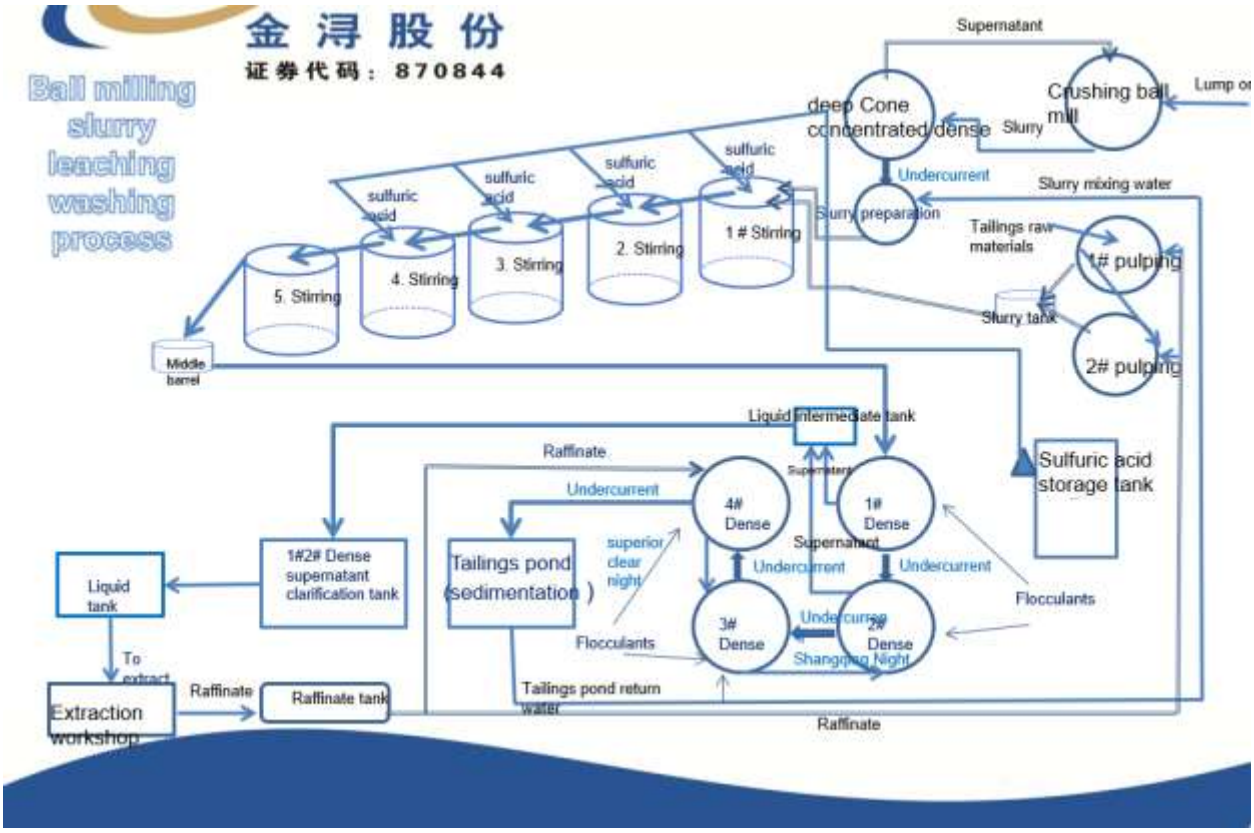


Figure 3 Ball milling slurry leaching washing process



3.2.4 The project products and By-products at both Implementation and operation phase

Products and By-Products During the Implementation Phase

The implementation phase encompasses site preparation, construction of the new processing and curing plant on Plot 19, and the renovation and upgrading of Leach Plants 1 and 2. During this phase, no commercial mineral products will be produced; however, several construction-related outputs and recoverable materials will arise.

Primary Outputs (Non-Commercial):

- Installed processing infrastructure, including curing buildings, crushing and screening systems, thickeners, mixer–settlers, electrowinning cells, electrical systems, and associated civil works.
- Upgraded and commissioned hydrometallurgical plant capacity prepared for full-scale operation.

By-Products and Residual Materials:

- **Scrap metal** generated from dismantling obsolete tanks, piping, busbars, electrical components, and redundant mechanical equipment. Where suitable, scrap metal will be segregated and recycled.
- **Construction debris**, including surplus concrete, excavated soil, broken masonry, and civil off-cuts from foundations, floors, and structural works.
- **Packaging waste**, such as pallets, plastic wrapping, crates, and drums associated with delivery of new equipment and materials.
- **Hazardous residues**, including waste oils, greases, paint residues, solvents, oily rags, and minor quantities of residual process chemicals recovered during plant draining and refurbishment.

All by-products generated during implementation will be handled through approved waste management systems, with hazardous materials stored temporarily in designated containment areas prior to off-site disposal or licensed treatment.

Products and By-Products During the Operation Phase

Once construction and commissioning are completed, the project will enter continuous operation involving raw material preparation, curing, leaching, solvent extraction, and electrowinning. The operational phase represents the primary productive life of the facility.

(a) Main Product

Cathode Copper

- The principal product of the operation will be LME-grade cathode copper with a purity of approximately 99.99%.
- Cathodes will be produced in standard plate form through the electrowinning process and harvested on a regular production cycle.
- Target production following expansion is approximately 56 tonnes per day, equivalent to about 18,500 tonnes per annum, subject to feed grade and operating efficiency.
- Finished cathodes will be washed, dried, bundled, and dispatched for sale to domestic and international markets.

(b) Operational By-Products and Residues

Leached Tailings and Washed Solids

- Residual solids generated after leaching and counter-current washing represent the largest by-product stream.
- These materials consist of chemically stabilised tailings with significantly reduced soluble copper content.
- Leached tailings will be transported and deposited in the approved Tailings Storage Facility (TSF) in accordance with the site's tailings management plan.

Process Solutions and Recycled Streams

- Raffinate, electrolyte bleed streams, and thickener overflows will be largely recycled within the closed-loop hydrometallurgical circuit.
- Controlled bleed streams may be generated to maintain solution chemistry and impurity control and will be managed in accordance with operational and environmental requirements.

Spent and Consumable Materials

- Worn or spent SX organic reagents, electrolyte impurities, and electrowinning residues (e.g. anode slimes, cathode trimming residues).
- Maintenance wastes, including worn liners, screens, conveyor belts, pipes, pump components, and mechanical parts.
- Used oils and lubricants from plant equipment and mobile machinery.
- Laboratory and analytical wastes generated during routine metallurgical and environmental monitoring.

Domestic and Office Waste

- General solid waste generated by operational personnel, including paper, plastics, food waste, and packaging materials.

3.2.5 Production capacity

The facility's cathode copper production capacity will increase from the current average of approximately 24.6 tonnes per day to a target of about 56 tonnes per day. This corresponds to an annual production capacity of approximately 18,500 tonnes of LME-grade cathode copper, assuming continuous operation.

3.2.6 Schedule and Lifetime of the Project

Rongxing Investments Limited estimated that the lifespan of the proposed project will follow the Processing Plant's lifespan which is approximately 15 years from the time it starts its production. It is anticipated that the project shall start by August 2026.

Table 8 Project Schedule

Activity / Phase	Dec 2025	Jan 2026	Feb 2026	March-May 2026	June - August 2026	Sept 2026	October 2026	Year 2041
8. ZEMA Approval								
9. Preparation Phase								
10. Modification of Structures								
11. Construction and Installation of structures								
12. Commissioning								
13. Operational Phase								
14. Decommissioning Phase								

3.3 Main Activities

The project will be executed through a structured sequence of activities designed to ensure orderly development, regulatory compliance, and operational readiness. Each phase will incorporate appropriate environmental, safety, and technical measures to support efficient implementation and long-term sustainability.

3.3.1 Site Preparation Phase

The site preparation phase will focus on preparing Plot 19 and associated areas within the existing industrial footprint for construction of the new raw material preparation and acid curing facilities, as well as for integration with Plant 1 and Plant 2. Key activities will include:

- **Regulatory Consultations and Approvals:** Engagement with ZEMA and other relevant authorities to ensure that the project expansion, tailings processing activities, and hydrometallurgical upgrades comply with statutory environmental and safety requirements.
- **Environmental Impact Statement (EIS) Submission:** Preparation and submission of this EIS to ZEMA for review and approval prior to commencement of construction works.
- **Site Surveying and Demarcation:** Surveying and pegging of Plot 19 and related operational areas to define the footprints for the curing building, screening systems, slurry preparation units, conveyors, access roads, and utility corridors.
- **Selective Vegetation Clearing:** Controlled clearing of vegetation strictly within the approved project boundary, limited to areas required for permanent infrastructure and access.
- **Topsoil Stripping and Conservation:** Removal and stockpiling of topsoil from disturbed areas for later use in rehabilitation, landscaping, and erosion control.
- **Earthworks, Grading, and Levelling:** Excavation, filling, and compaction works to establish stable platforms for foundations of the curing building, screening plant, thickener units, and associated infrastructure.
- **Temporary Access and Traffic Management:** Establishment or upgrading of internal access roads to support safe movement of construction equipment, materials, and personnel.
- **Stormwater and Erosion Control Measures:** Installation of temporary drainage channels, berms, silt traps, and diversion structures to manage runoff and prevent erosion during site works.

- **Construction Support Facilities:** Installation of temporary site offices, material laydown areas, workshops, ablution facilities, and temporary water and power connections to support construction activities.

3.3.2 Construction Phase

The construction phase will involve the development of all permanent infrastructure required for the expanded hydrometallurgical operation and the installation of new and upgraded processing systems. The main activities will include:

- **Civil Works and Foundations:** Construction of reinforced concrete foundations for the enclosed acid curing building, wet screening plant, slurry preparation systems, thickeners, pumps, and conveyor structures.
- **Construction of the Enclosed Curing Facility:** Erection of the steel-frame curing building (approximately 7 m high, 200 m long, and 30 m wide) designed to support 6 m-high curing stockpiles and a 4,000 t/day throughput.
- **Installation of Screening and Crushing Systems:** Relocation and installation of wet screening equipment, impact crushers, and associated conveyors for preparation of tailings and overburden material.
- **Mechanical and Electrical Installation:** Installation of mixers, agitators, pumps, thickeners, pipelines, electrical cabling, control panels, instrumentation, and automation systems.
- **SX–EW Plant Upgrades:** Expansion and modification of solvent extraction circuits, installation of additional extraction and stripping stages, and expansion of electrowinning cells, rectifiers, and busbar systems in Plant 1 and Plant 2.
- **Environmental Protection Infrastructure:** Construction of bunded chemical storage areas, oil-water separators, solution containment systems, controlled waste storage facilities, and ventilation systems to minimize emissions and spills.
- **Internal Roads and Material Handling Areas:** Construction of internal haul roads, turning areas, loading and unloading zones, and traffic control features to support safe operations.
- **Testing, Commissioning, and Performance Verification:** Mechanical completion checks, dry and wet commissioning, safety inspections, and process performance testing to confirm readiness for full-scale operation.

3.3.3 Operation Phase

The operational phase will involve continuous hydrometallurgical processing of low-grade tailings and overburden ore to produce cathode copper. Activities during this phase will include:

- **Raw Material Reception and Handling:** Controlled receipt, screening, crushing, and transfer of tailings and overburden materials to the preparation and curing systems.
- **Acid Curing and Leaching Operations:** Mixing of prepared material with sulfuric acid and water, curing under controlled conditions, followed by agitation leaching to solubilize copper.
- **Solid–Liquid Separation and Washing:** Operation of high-rate thickeners and washing systems to recover pregnant leach solution and maximize copper recovery.
- **Solvent Extraction and Electrowinning:** Continuous operation of upgraded SX circuits and expanded EW cells to produce high-purity cathode copper.
- **Water Management and Recycling:** Return of thickener overflow and raffinate to the process circuit, minimizing freshwater abstraction and liquid effluent discharge.
- **Environmental Management:** Implementation of approved waste management plans, tailings management procedures, emissions control measures, spill prevention and response systems, and routine environmental monitoring.
- **Maintenance and Plant Reliability:** Preventive and corrective maintenance of mechanical, electrical, and instrumentation systems to ensure consistent plant performance.
- **Occupational Health and Safety:** Enforcement of site safety procedures, routine inspections, emergency preparedness drills, and ongoing training for employees.
- **Monitoring, Reporting, and Compliance:** Regular submission of environmental, safety, and production reports to regulatory authorities in accordance with permit conditions.

3.3.4 Decommissioning and Closure Phase

At the end of the project's operational life, a structured decommissioning and closure process will be implemented to ensure that the site is left in a safe and environmentally stable condition. Planned activities will include:

- **Controlled Shutdown of Operations:** Progressive cessation of processing activities, isolation of utilities, and safe de-energisation of electrical and mechanical systems.

- **Dismantling and Removal of Infrastructure:** Removal of processing equipment, structures, pipelines, and auxiliary facilities, with salvage and reuse of materials where practicable.
- **Waste and Residual Material Management:** Removal and proper disposal of remaining chemicals, process residues, demolition waste, and hazardous materials in compliance with regulatory requirements.
- **Soil Assessment and Remediation:** Investigation of potential contamination and implementation of remediation measures such as excavation, stabilization, or treatment where required.
- **Land Regrading and Rehabilitation:** Recontouring of disturbed areas, replacement of conserved topsoil, and re-vegetation to restore site stability and minimize erosion.
- **Closure Monitoring and Certification:** Post-closure environmental monitoring, audits, and submission of closure reports to relevant authorities to confirm compliance and obtain formal closure approval

4.0 PROJECT ALTERNATIVES

4.1 Identification of alternatives

4.1.1 Products and Services Alternatives

Alternative 1: Copper Ore Supply Only

One alternative considered was limiting the company's operations to the supply of copper-bearing ore and tailings to third-party processors. Under this scenario, Rongxing Investments Limited would function primarily as a material supplier rather than a processing entity. While this option would reduce onsite processing complexity, it would significantly limit value addition, reduce employment opportunities, and fail to capitalize on the company's existing hydrometallurgical infrastructure. In addition, this alternative would not address the long-term challenge of underutilized low-grade tailings and would provide minimal environmental benefit.

Alternative 2: Copper Ore Mining Operations

The option of expanding into full-scale copper ore mining was also examined. This alternative would require substantial capital investment in mine development, waste rock handling facilities, and comprehensive environmental management systems. Mining operations would introduce additional environmental impacts, including large-scale land disturbance, dust generation, and potential groundwater interaction. Given the availability of already-mined tailings and overburden materials in the region, this alternative was considered less sustainable and environmentally efficient.

Preferred Alternative: Copper Cathode Production using Hydrometallurgical Processing

The preferred alternative involves continued and expanded production of copper cathode using hydrometallurgical processing. This approach enables maximum value addition through solvent extraction and electrowinning, supports national mineral beneficiation objectives, and allows efficient recovery of copper from low-grade tailings and oxide ores. The closed-loop nature of the hydrometallurgical system also facilitates improved environmental control and resource efficiency.

4.1.2 Site Alternatives

Alternative 1: Development on Plot 19 (Proposed Site)

Plot 19 was identified as the preferred site for construction of the new raw material preparation and acid curing plant. The site provides sufficient land area to accommodate a 6,000 m² enclosed curing facility and associated screening, crushing, and slurry preparation systems. Its proximity to Leach Plant 2 allows seamless integration into existing leach and recovery circuits, minimizing material handling distances and energy consumption. The site is located within an established industrial zone, reducing the risk of social and environmental conflict.

Alternative 2: Continued Use of Plot 17

Plot 17, which historically hosted screening and crushing infrastructure, was assessed as an alternative site. However, its limited available space and existing layout make it unsuitable for high-capacity curing stockpiles and large-scale screening operations. Extensive demolition and reconfiguration would be required, increasing project cost, construction time, and operational disruption. Consequently, Plot 17 was not selected.

4.1.3 Design Alternatives

Alternative 1: Integrated Expansion and Technical Renovation (Preferred Design)

The preferred design alternative combines physical expansion with technical renovation of existing facilities. Expansion is achieved through the construction of a new front-end raw material preparation and acid curing plant on Plot 19, while technical renovation focuses on upgrading leach tanks, solvent extraction circuits, and electrowinning systems in Plants 1 and 2. This integrated approach ensures that increased feed capacity is matched by enhanced downstream recovery capacity, thereby avoiding process bottlenecks and ensuring operational stability.

Alternative 2: Expansion without Backend Renovation

An alternative design involving expansion of feed preparation capacity without upgrading downstream processing units was considered. Under this scenario, the existing leach and recovery circuits would be required to handle significantly increased slurry and solution flows. This alternative was rejected due to the high risk of process instability, reduced copper recovery, and increased environmental risk associated with overloaded systems.

Alternative 3: Technical Renovation without Expansion

Technical renovation of existing facilities without increasing feed preparation capacity was also evaluated. While this option would improve operational efficiency, it would not enable the processing of low-grade tailings at the required scale. As such, it would fail to achieve the project's production targets and long-term sustainability objectives.

4.1.4 Technology Alternatives

Alternative 1: Hydrometallurgical Processing (Preferred Technology)

The hydrometallurgical processing route, incorporating acid curing, stirred leaching, counter-current decantation, solvent extraction, and electrowinning, was selected as the preferred technology. This approach is well suited to low-grade oxide ores and tailings, integrates seamlessly with existing infrastructure, and allows high levels of water and reagent recycling. It also generates significantly lower air emissions compared to thermal processing technologies.

Alternative 2: Heap Leach Technology

Heap leaching was considered but rejected due to its extensive land requirements, long leaching cycles, and poor performance with fine-grained tailings. The exposure of leach heaps to rainfall would also increase the risk of uncontrolled seepage and environmental contamination.

Alternative 3: Pyrometallurgical Smelting

Pyrometallurgical smelting was assessed but deemed unsuitable due to the low copper grade of the available feed material, high capital and energy requirements, and significant air emission impacts.

4.1.5 Process Alternatives

Alternative 1: Modified Solvent Extraction Configuration (Preferred Process)

The preferred process configuration incorporates additional extraction and stripping stages optimized for low copper concentrations in pregnant leach solutions. This configuration improves mass transfer efficiency, reduces organic losses, and enhances overall copper recovery and cathode quality.

Alternative 2: Conventional Solvent Extraction Configuration

Conventional solvent extraction configurations were found to be less effective when treating dilute solutions, resulting in reduced copper recovery and higher reagent losses.

Alternative 3: No Upgrade to SX–EW System

Maintaining the existing SX–EW system without modification would prevent achievement of the targeted production capacity and increase the likelihood of operational bottlenecks.

4.1.6 Raw Material Alternatives

Alternative 1: Tailings and Overburden Ore (Preferred Raw Material)

The use of locally available tailings and overburden material was selected as the preferred raw material option. This approach supports waste reprocessing, reduces legacy environmental liabilities, and aligns with the hydrometallurgical design of the plant.

Alternative 2: Purchase of High-Grade Ore

While technically feasible, reliance on purchased high-grade ore would expose the operation to supply and price volatility.

Alternative 3: Importation of Copper Concentrate

Importation of concentrate was rejected due to incompatibility with existing plant design and the need for substantial process modifications.

4.1.7 Water Resource Alternatives

Alternative 1: Process Water Recycling (Preferred Option)

The preferred water management option emphasizes maximum recycling through thickener overflow return, TSF water recovery, and raffinate reuse, minimizing freshwater abstraction.

Alternative 2: Exclusive Fresh Water Use

Exclusive reliance on fresh water was assessed as environmentally unsustainable and operationally costly.

Alternative 3: Blended Water Use

Blended water use provides partial improvement but remains inferior to full recycling.

4.1.8 Energy Resource Alternatives

Alternative 1: Grid Electricity with Backup Generators (Preferred Option)

Grid electricity supplemented by standby generators was selected as the most reliable and cost-effective energy supply option for the expanded facility.

Alternative 2: Diesel-Only Power Supply

Exclusive reliance on diesel generators was deemed unsuitable due to high operational costs and environmental emissions

4.1.9 No Project Option

This alternative is technically sound and aligns with the strategic need to utilize abundant tailings and overburden resources. It enables modernized slurry systems, improved leaching kinetics, and a shift to a sustainable long-term feed source. The initiative will also enhance copper recovery efficiencies by integrating a high-capacity thickener system, upgraded SX mixers, and additional EW cells. Environmentally, it minimizes reliance on high-grade ore mining.

4.2 Analysis of each of the Identified Alternatives

4.2.1 Analysis of Product and Service Alternatives

Copper Ore Supply Only

The alternative of limiting operations to the supply of copper-bearing ore or tailings to third-party processors was analysed from a technical, environmental, and economic perspective. While this option would significantly reduce onsite processing activities, it would also eliminate the opportunity for value addition through beneficiation. The approach would underutilize existing hydrometallurgical infrastructure and skilled workforce, resulting in lower economic returns and reduced employment opportunities. Environmentally, the continued handling and stockpiling of raw materials without controlled processing would maintain dust, runoff, and material handling risks without achieving the environmental benefits associated with stabilized tailings after leaching. This alternative was therefore considered suboptimal in terms of sustainability and long-term operational objectives.

Copper Ore Mining Operations

The option of expanding into copper ore mining was assessed as a fundamentally different development pathway. Although mining could secure direct control over feed supply, it would require extensive capital investment in mine development, waste rock handling, and mine closure planning. Mining activities would introduce additional environmental impacts, including large-scale land disturbance, vegetation clearance, increased dust and noise emissions, and potential impacts on groundwater systems. Given the availability of large volumes of already-mined tailings and overburden material within the region, this alternative was considered environmentally intrusive and economically inefficient when compared to reprocessing existing materials.

Copper Cathode Production using Hydrometallurgical Processing

The hydrometallurgical copper cathode production alternative was analysed as the most technically appropriate and sustainable option. This approach enables efficient recovery of copper from low-grade tailings and oxide ores using established acid leaching, solvent extraction, and electrowinning technology. The process allows for controlled chemical handling, high levels of water and reagent recycling, and production of a high-value final product. From an environmental perspective, hydrometallurgical processing generates lower atmospheric emissions than thermal alternatives and allows residues to be chemically stabilized prior to disposal. This alternative aligns with national mineral beneficiation objectives and supports long-term economic viability.

4.2.2 Analysis of Site Alternatives

Development on Plot 19

The development of new curing and raw-material preparation infrastructure on Plot 19 was analysed in terms of spatial suitability, environmental risk, and operational integration. Plot 19 provides sufficient land area to accommodate a large enclosed curing facility and associated screening, crushing, and slurry preparation systems. Its proximity to existing Leach Plant 2 minimizes material transport distances, reducing energy consumption, dust generation, and operational complexity. The site is located within an established industrial area, which limits the need for new access roads and reduces potential land-use conflicts. Environmental risks associated with construction and operation can be effectively managed through engineered containment, lined floors, and controlled drainage systems. This option was therefore considered technically and environmentally suitable.

Continued Use of Plot 17

The continued use of Plot 17 for the proposed expansion was analysed and found to be constrained by limited available space and an existing layout that is incompatible with large-scale curing operations. The site cannot safely accommodate six-metre-high curing stockpiles or the required throughput of 4,000 tonnes per day. Significant demolition and reconfiguration would be required, increasing construction duration, cost, and operational disruption. Additionally, congestion at Plot 17 would elevate safety risks and complicate environmental management. As a result, this alternative was considered impractical.

4.2.3 Analysis of Design Alternatives

Integrated Expansion and Technical Renovation Design

The integrated design alternative, combining expansion with technical renovation, was analysed as the most balanced approach to achieving the project objectives. Expansion through construction of a new front-end curing and preparation plant increases raw-material throughput, while technical renovation of existing leach, SX, and EW systems ensures that downstream recovery capacity is adequately matched. This configuration minimizes bottlenecks, enhances metallurgical efficiency, and improves environmental performance through enclosed processing and upgraded solution management systems. The design maximizes use of existing infrastructure while introducing new capacity only where required, thereby reducing unnecessary land disturbance and capital expenditure.

Expansion without Backend Renovation

This alternative was analysed as presenting significant technical and environmental risks. Without upgrading downstream systems, increased feed preparation capacity would overwhelm existing leach and recovery circuits, resulting in unstable operation, reduced copper recovery, and increased likelihood of solution overflows or process upsets. Such conditions would elevate environmental risk and compromise product quality. Consequently, this option was deemed technically unviable.

Technical Renovation without Expansion

The option of renovating existing facilities without expanding feed preparation capacity was analysed as insufficient to address long-term raw material availability challenges. While metallurgical efficiency could be improved, the facility would remain constrained by limited feed preparation capacity and continued reliance on declining higher-grade ore sources. This alternative would not achieve the targeted production increase and was therefore rejected.

4.2.4 Analysis of Technology Alternatives

Hydrometallurgical Processing Technology

Hydrometallurgical processing was analysed as the most appropriate technology for the available feed materials. The process is well suited to low-grade tailings and oxide ores and integrates effectively with existing plant infrastructure. It allows for high levels of water and reagent recycling, lower energy consumption compared to thermal processes, and controlled management of residues. Environmental impacts are more readily mitigated through engineered containment and process control.

Heap Leach Technology

Heap leaching was analysed and found to be unsuitable due to extensive land requirements, long leach cycles, and poor performance with fine-grained tailings. Exposure of leach heaps to rainfall would increase the risk of uncontrolled seepage and solution loss, presenting significant environmental management challenges. This alternative was therefore rejected.

Pyrometallurgical Smelting Technology

Pyrometallurgical smelting was analysed as technically incompatible with the low copper grades of the available feed material. The process requires high-grade concentrate and entails high capital investment, energy consumption, and atmospheric emissions. This alternative was therefore considered infeasible.

4.2.5 Analysis of Process Configuration Alternatives

Modified Solvent Extraction Configuration

The modified solvent extraction configuration optimized for low-grade pregnant leach solution was analysed as the most effective process arrangement. The configuration improves phase contact, reduces organic losses, and enhances copper recovery efficiency, supporting stable electrowinning operations and consistent cathode quality.

Conventional Solvent Extraction Configuration

Conventional SX configurations were analysed and found to be less efficient when treating dilute solutions, resulting in lower copper recovery and increased reagent losses. This option was therefore considered inferior.

No Upgrade to SX–EW System

Retaining the existing SX–EW configuration without modification was analysed as insufficient to achieve the targeted production capacity and would increase operational instability. This alternative was rejected.

4.2.6 Analysis of Raw Material Alternatives

Tailings and Overburden Material

The use of tailings and overburden material was analysed as the most sustainable raw material option. These materials are abundant, locally available, and currently underutilized. Their processing supports waste re-mining, reduces legacy environmental liabilities, and aligns with the hydrometallurgical process design.

High-Grade Ore Purchase

Purchasing high-grade ore was analysed as introducing supply insecurity and exposure to price volatility. This option was considered less sustainable in the long term.

Imported Concentrate

Importation of concentrate was analysed and found to be incompatible with existing plant design and would require substantial modification to processing circuits. This option was therefore rejected.

4.2.7 Analysis of Water Resource Alternatives

Process Water Recycling

Process water recycling was analysed as the preferred option due to its ability to minimize freshwater abstraction, stabilize process chemistry, and reduce environmental discharge. The closed-loop system supports sustainable water management.

Exclusive Fresh Water Use

Exclusive use of fresh water was analysed as environmentally unsustainable and operationally costly, particularly under increased production rates.

Blended Water Use

Blended water use offers partial improvement but remains less effective than full recycling and was not selected as the primary strategy.

4.2.8 Analysis of Energy Resource Alternatives

Grid Electricity with Backup Generators

Grid electricity supplemented by backup generators was analysed as the most reliable and cost-effective energy supply option. It is well suited to high-current electrowinning operations and reduces reliance on diesel fuel.

Diesel-Only Power Supply

Exclusive reliance on diesel generators was analysed as economically and environmentally unfavorable due to high fuel costs and emissions. This option was rejected.

4.3 List of chosen alternatives in order of preference

4.3.1 Preferred Product and Service Alternative

The preferred product and service alternative is the production of copper cathode through hydrometallurgical processing using acid leaching and solvent extraction–electrowinning (SX–EW).

This alternative is selected because it represents the highest level of value addition within the copper value chain and is fully aligned with the company's existing infrastructure, technical expertise, and strategic objectives. Producing LME-grade cathode copper enables efficient utilization of low-grade tailings and high-bonded oxide ores that are otherwise uneconomic for direct sale or conventional mining. The hydrometallurgical route allows controlled processing, improved environmental management, and stable production of a high-purity final product, while supporting national mineral beneficiation policies and long-term economic sustainability.

4.3.2 Preferred Site Alternative

The preferred site alternative is the development of new raw-material preparation and acid curing infrastructure on Plot 19. This site provides sufficient space to accommodate the required enclosed curing building and associated processing systems and is strategically located near existing leach and recovery plants. Development on Plot 19 minimizes material handling distances, avoids congestion at existing operational areas, and limits additional land disturbance by utilizing an established industrial zone.

4.3.3 Preferred Design Alternative

The preferred design alternative is the integrated expansion and technical renovation design, which combines the construction of new front-end feed preparation and curing facilities with the upgrading and reconfiguration of existing leach, solvent extraction, and electrowinning systems in Plants 1 and 2. This design ensures that increased feed preparation capacity is matched by adequate downstream recovery capability, thereby maintaining operational balance, metallurgical efficiency, and environmental control.

4.3.4 Preferred Technology Alternative

The preferred technology alternative is hydrometallurgical copper processing incorporating acid curing, agitation leaching, counter-current decantation, solvent extraction, and electrowinning. This technology is best suited to the mineralogical characteristics of the available low-grade tailings and oxide ores and allows efficient copper recovery with relatively low energy intensity and reduced atmospheric emissions compared to thermal processing routes.

4.3.5 Preferred Process Configuration Alternative

The preferred process configuration is the modified solvent extraction configuration optimized for low-grade pregnant leach solution, incorporating multiple extraction stages, organic washing, and optimized stripping. This configuration improves mass transfer efficiency, reduces organic losses, and enhances cathode quality under dilute solution conditions.

4.3.6 Preferred Raw Material Alternative

The preferred raw material alternative is the use of locally available low-grade tailings and high-bonded oxide ores**.** This option ensures long-term feed availability, reduces reliance on third-party suppliers, supports reprocessing of legacy materials, and aligns with the hydrometallurgical design of the plant.

4.3.7 Preferred Water Resource Alternative

The preferred water resource alternative is maximum process water recycling, utilizing thickener overflow return, tailings storage facility return water, and controlled fresh water supplementation only where necessary. This approach minimizes freshwater abstraction and supports stable hydrometallurgical operation.

4.3.8 Preferred Energy Resource Alternative

The preferred energy resource alternative is the use of grid electricity supplemented by standby diesel generators**.** This configuration provides reliable power for high-current electrowinning operations while minimizing fuel consumption, emissions, and operational costs.

4.4 Reasons for choosing the preferred alternatives and Rejecting the Other Alternatives

4.4.1 Reason for Choosing the Preferred Product and Service Alternative

The production of copper cathode through hydrometallurgical processing using acid leaching and SX–EW was selected as the preferred product and service alternative because it provides the highest level of value addition and is fully compatible with the company's existing infrastructure and technical capacity. This option enables efficient recovery of copper from low-grade tailings and high-bonded oxide ores, supports national mineral beneficiation objectives, and allows controlled environmental management through closed-loop processing systems. Alternatives involving ore supply only or mining were rejected due to limited value addition, higher environmental impacts, and misalignment with available resources.

4.4.2 Reason for Choosing the Preferred Site Alternative

Development on Plot 19 was selected as the preferred site because it provides sufficient space for the required curing and preparation infrastructure and allows efficient integration with existing processing plants. The site's location within an established industrial area minimizes additional land disturbance and operational conflicts. Continued use of Plot 17 was rejected due to spatial limitations, safety concerns, and inability to accommodate high-capacity curing operations.

4.4.3 Reason for Choosing the Preferred Design Alternative

The integrated expansion and technical renovation design was selected because it balances new capacity development with optimization of existing infrastructure. This approach ensures that increased feed preparation capacity is matched by adequate downstream recovery capability, thereby maintaining process stability and efficiency. Design options involving expansion or renovation only were rejected as they would either overload existing systems or fail to achieve the required production increase.

4.4.4 Reason for Choosing the Preferred Technology and Process Configuration

Hydrometallurgical processing with a modified solvent extraction configuration was selected as it is best suited to the mineralogical characteristics of the available feed material and allows efficient copper recovery under low-grade solution conditions. Alternative technologies such as heap leaching and pyrometallurgical smelting were rejected due to land constraints, poor technical suitability, high energy demand, and increased environmental risk.

4.4.5 Reason for Choosing the Preferred Raw Material Alternative

The use of locally available tailings and high-bonded oxide ores was selected because these materials are abundant, underutilized, and suitable for hydrometallurgical processing. Alternatives involving purchase of high-grade ore or importation of concentrate were rejected due to supply insecurity, cost volatility, and incompatibility with existing plant design.

4.4.6 Reason for Choosing the Preferred Water and Energy Alternatives

Maximum process water recycling was selected to minimize freshwater abstraction and support stable plant operation, while grid electricity supplemented by standby generators was chosen to provide reliable and cost-effective power. Exclusive reliance on fresh water or diesel-only power supply was rejected due to higher environmental impact, increased operating costs, and inconsistency with sustainable development principles.

5.0 ENVIRONMENTAL BASELINE STUDY

This chapter presents the existing environmental and socio-economic conditions of the proposed project area and its zone of influence prior to project implementation. The baseline environment has been described with emphasis on components that are sensitive to hydrometallurgical copper processing activities, including land, water, air, biological resources, and human settlements. The assessment provides a benchmark against which potential impacts associated with the renovation and expansion of Rong Xing Investments Limited's copper processing operations can be evaluated.

5.1 Description of the Project Area

The proposed project site by Rong Xing Investment Limited, is located on Subdivision A of Subdivision E of Lot No. L/541/M within the Chambishi in Kalulushi, Copperbelt Province. Situated 4 kilometres north of the Kitwe-Chingola Sabina Road junction and 2.07 km north-west of the Kitwe-Mufulira Road, the site benefits from direct access to major transport corridors, ensuring logistical efficiency for material and personnel movement. For those traversing from Kitwe's central business district (CBD), the site lies a mere 20 kilometres away and approximately 18.40 km south-west from Mufulira's central business district (CBD). Key landmarks in proximity include Lifesong Twalima Farm, positioned 2.04 km south-east of the plant, and Luongo SDA Church, located approximately 1.5 km east of the plant. The Sabina Central Police checkpoint, situated 3.5 km south the screening plant, provides essential security services to the area. Industrially, the plant is strategically positioned 7.07 km south-east of the NFC Africa Copper Mine, a major copper production facility, underscoring the region's focus on mining and mineral processing. This location capitalizes on the industrial synergy of the Chambishi Industrial Area, including proximity to the Chambishi Copper Smelter (CCS), ensuring operational efficiency and alignment with Zambia's copper production ecosystem.

Current State of the Environment

The current state of the environment at Plot 19 is characterized by a largely open and level terrain with minimal existing infrastructure, situated adjacent to Leach Plant 2 and across the railway line. The site exhibits sparse natural vegetation, primarily grasses and scattered shrubs, with no significant water bodies, wetlands, or sensitive ecological habitats present within the footprint. The area is industrially zoned, with low socio-economic activity and no permanent residential settlements, although local communities may access the land for farming and other informal purposes. Its proximity to existing processing infrastructure and basic access roads provides strategic advantage for integration with the planned 4,000 t/day wet screening and slurry preparation facility, while minimizing potential environmental constraints related to flora, fauna, water resources, or community disruption.

Table 9 Geographic Coordinates of the proposed project

POINTS	LATITUDE	LONGITUDE
A	12°41'12.37"S	28° 7'25.29"E
B	12°41'10.88"S	28° 7'28.63"E
C	12°41'1.72"S	28° 7'24.25"E
D	12°41'3.59"S	28° 7'20.63"E
Leach Plants Coordinates		
Leach Plant 1	12°41'44.03"S	28° 7'29.49"E
Leach Plant 2	12°41'17.22"S	28° 7'21.74"E

Figure 4 Proposed Project Site.

5.1.1 Ecological Zoning as well as the state of the Environment

Ecological Zoning

The proposed project site lies in Agro- ecological zone (iii), it is characterized by a mix of open grasslands and miombo woodlands. The region exhibits a humid subtropical climate with distinct wet (November to April) and dry (May to October) seasons. Annual rainfall averages around 1,000 - 1500 mm, supporting the local flora and ensuring adequate groundwater recharge. Overall, the environmental conditions are conducive for development, with a generally balanced ecological state and industrial disturbances.

State Of the Environment

The current state of the environment at Plot 19 is characterized by a largely open and level terrain with minimal existing infrastructure, situated adjacent to Leach Plant 2 and across the railway line. The site exhibits sparse natural vegetation, primarily grasses and scattered shrubs, with no significant water bodies, wetlands, or sensitive ecological habitats present within the footprint. The area is industrially zoned, with low socio-economic activity and no permanent residential settlements, although local communities may access the land for farming and other informal purposes. Its proximity to existing processing infrastructure and basic access roads provides strategic advantage for integration with the planned 4,000 t/day wet screening and slurry preparation facility, while minimizing potential environmental constraints related to flora, fauna, water resources, or community disruption.

Figure 5 Current site photos

Figure 6 Map of Zambia showing the Agro-zones of Zambia

5.1.2 Methodology for Environmental Baseline Data Collection

The methodology employed for collecting environmental and socio-economic baseline data for this Environmental Impact Statement (EIS) was designed to ensure a comprehensive understanding of the current environmental and social conditions within the proposed project area. A combination of primary and secondary data sources, field surveys, laboratory analysis, and modeling tools were utilized. The baseline data provides a critical reference point for assessing potential project impacts and formulating appropriate mitigation and management strategies.

Study Objectives

The main objectives of the baseline data collection were:

- To establish the current state of the biophysical and socio-economic environment.
- To provide a scientific basis for identifying, predicting, and evaluating potential project impacts.
- To inform the development of effective mitigation and enhancement measures.
- To support evidence-based decision-making through stakeholder engagement and regulatory compliance.

Approach to Data Collection

The data collection approach was multidisciplinary and encompassed the following areas: water quality, air quality, noise levels, soil characteristics, flora and fauna, and socio-economic conditions.

Water Quality Assessment

Water quality data was collected to characterize both surface and groundwater sources in the vicinity of the project site. Composite water sample was drawn from Luale stream (Upstream, Midstream and Downstream) and Nearby community wells and RongXing Plant Site borehole to ensure representative coverage of the hydrological environment. Parameters tested included pH, temperature, turbidity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), heavy metals (copper, lead, zinc), nitrates, and *Escherichia coli* (E. coli).

Sample collection and analysis were carried out in accordance with the ZEMA and ZABs Standard Methods for the Examination of Water and Wastewater. The results were used to determine the existing quality of water resources and assess the risk of contamination from the proposed project activities.

Air Quality Monitoring

To establish the existing ambient air quality, air sampling was undertaken using portable air quality monitors (Temtop Paticles Detector – M2000C). Sampling focused on pollutants of concern such as Total Suspended Particulates (TSP), Particulate Matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NOx), and carbon monoxide (CO).

The monitoring was guided by Zambia Environmental Management Agency (ZEMA) regulations and aligned with World Health Organization (WHO) ambient air quality guidelines. Data collected informed the baseline concentrations of air pollutants and provided a foundation for modeling potential emissions and dust levels during construction and operational phases.

Ambient Noise Measurements

Baseline noise levels were recorded at locations proximal to sensitive receptors such as residential communities, schools, and health facilities. Measurements were taken using a Sound level meter (Casella CEL24X) capable of capturing real-time sound pressure levels in decibels (dBA).

The data collected was used to evaluate existing noise conditions and will aid in predicting future noise propagation from project machinery and transport activities, using ISO 9613-based noise modeling tools.

Soil Quality and Composition

Soil sampling was conducted at multiple locations across the project site, focusing on the upper 30 cm soil horizon. The collected samples were analyzed for pH, texture, macronutrients (Nitrogen, Phosphorus, and Potassium), and heavy metal concentrations.

This information was essential in determining the soil's current condition, assessing contamination risks, and evaluating its suitability for construction and rehabilitation works post-project closure.

Biodiversity Assessment (Flora and Fauna)

To assess the biological environment, ecological surveys were conducted using standard ecological methods, including transect walks and quadrat sampling. These surveys recorded species composition, abundance, conservation status, and habitat conditions.

Special attention was given to identifying any endangered or protected species within the project footprint. The findings informed the assessment of biodiversity loss risk and guided the development of conservation or habitat restoration measures where necessary.

Socio-Economic Survey

The socio-economic baseline was established through a combination of quantitative and qualitative methods. Household surveys captured demographic characteristics, income sources, employment levels, land use practices, and access to social services. In addition, key informant interviews and focus group discussions were conducted with community leaders, local authorities, and vulnerable groups to gain deeper insights into community dynamics and perceptions about the project.

This data was instrumental in identifying social risks (such as displacement, land pressure, or community conflict) and opportunities for local development benefits.

Application of Predictive Models and Standards

To enhance the objectivity of impact assessment and reduce uncertainty, several predictive tools and internationally recognized standards were integrated into the methodology:

- Air Dispersion Modeling: Models such as *AERMOD* and *SCREEN3* were considered to simulate the dispersion of airborne pollutants under various meteorological conditions.
- Noise Prediction: Sound propagation from project sources was modeled using methods based on ISO 9613 standards.
- Impact Significance Matrices: Tools such as the Leopold Matrix and the Battelle Environmental Evaluation System were used to rank potential impacts based on magnitude and significance.
- GIS-Based Spatial Analysis: Geographic Information Systems (GIS) supported spatial mapping of sensitive receptors, land use, and environmental buffers.
- Regulatory Compliance: All data collection and analysis methods adhered to relevant ZEMA standards, WHO guidelines, and IFC Performance Standards, ensuring both local and international regulatory compliance.

5.2 Climate

The project area experiences climatic conditions characteristic of the Copperbelt Plateau. The climate is subtropical with three distinct seasons: a warm wet season (October to April), a cool dry season (May to August), and a hot dry season (September to October).

Rainfall: Mean annual rainfall in the Kalulushi District averages approximately 900–1,000 mm, with peak rainfall occurring between December and February. Rainfall intensity is moderate to high during the rainy season, contributing to surface runoff and seasonal recharge of groundwater systems.

Temperature: Mean maximum temperatures range from approximately 22–24°C during the cool season (June–July) to about 30–32°C during the hottest months (September–October). Mean minimum temperatures range between 9–12°C in the cool season and 18–20°C during the warmer months.

Relative Humidity: Average relative humidity is approximately 55–65%, with higher values recorded during the rainy season and lower values during the dry months.

Sunshine: The area receives an average of 8–9 hours of sunshine per day annually, with reduced sunshine during peak rainfall months due to increased cloud cover.

Figure 7 Chambishi Climatic Data

CLIMATE TABLE // WEATHER BY MONTH CHAMBISHI

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	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	21.1 °C (70.1) °F	21.2 °C (70.2) °F	21.1 °C (70.1) °F	20.9 °C (69.6) °F	20.5 °C (68.8) °F	18.8 °C (65.8) °F	18.4 °C (65.1) °F	21.1 °C (69.9) °F	24.4 °C (75.9) °F	25.9 °C (78.6) °F	23.4 °C (74.2) °F	21.5 °C (70.7) °F
Min. Temperature °C (°F)	17.9 °C (64.2) °F	17.8 °C (64.1) °F	17.6 °C (63.6) °F	16.6 °C (61.9) °F	15.1 °C (59.1) °F	13.1 °C (55.6) °F	12.4 °C (54.4) °F	14.9 °C (58.8) °F	18 °C (64.4) °F	20 °C (68.1) °F	19 °C (66.2) °F	18 °C (64.4) °F
Max. Temperature °C (°F)	25.5 °C (77.9) °F	25.7 °C (78.3) °F	25.7 °C (78.2) °F	25.8 °C (78.5) °F	26.3 °C (79.4) °F	24.9 °C (76.9) °F	24.8 °C (76.7) °F	27.7 °C (81.8) °F	30.9 °C (87.6) °F	31.8 °C (89.3) °F	28.7 °C (83.6) °F	26 °C (78.8) °F
Precipitation / Rainfall mm (in)	284 (11)	234 (9)	174 (6)	37 (1)	4 (0)	0 (0)	0 (0)	0 (0)	1 (0)	18 (0)	128 (5)	260 (10)
Humidity(%)	83%	82%	80%	67%	51%	47%	44%	36%	30%	34%	62%	80%
Rainy days (d)	20	18	16	6	1	0	0	0	0	2	12	19
avg. Sun hours (hours)	8.0	7.7	7.2	7.8	9.7	9.9	9.9	10.4	10.7	10.9	9.8	8.1

Source: https://en.climate-data.org/africa/zambia/copperbelt-province/chambishi-54577/

5.3 Air Quality

Baseline ambient air quality in the project area reflects conditions typical of a peri-industrial setting. Existing air quality influences include vehicular traffic along the M4 Kitwe–Mufulira Road, nearby industrial operations, and localized dust generation from unpaved access roads.

Measured and observed baseline concentrations of Total Suspended Particulates (TSP), PM_{10}, and $PM_{2.5}$ are generally low to moderate and remain within permissible limits set by ZEMA and the Zambia Bureau of Standards for industrial and mixed-use environments. Gaseous pollutants such as sulphur dioxide (SO_2), nitrogen oxides (NO_x), and carbon monoxide (CO) are present at low background levels, primarily associated with combustion sources from vehicles and nearby processing facilities.

The air environment is considered moderately sensitive due to the presence of workers, nearby industrial facilities, and occasional settlements, but it is already adapted to industrial activity.

5.3.1 Air quality standards

The standards of air quality in Zambia are regulated by the Environmental Management (Licensing) Regulations, SI No. 112 of 2013 under the Second Schedule (Regulations 5, 6 and 7(1)) as shown in the table below.

Table 10 Zambian and WHO Air Quality Guidelines for ambient air pollutants

Parameter	**Reference Time**		**Zambian Guidelines*1**	**WHO Guidelines *2**
Respirable particulate	PM10	24 hours	70µg/m3	45 µg/m3
	PM2.5	24 hours	-	15 µg/m3
Sulphur dioxide (SO2)	10 minutes		500µg/m3	50 µg/m3
	1 hour		350µg/m3	-
Sulphur dioxide (SO2) in combination with Total	SO2	24 hours	125µg/m3	40 µg/m3
		6 months	50 µg/m3	-
	TSP	24 hours	120 µg/m3	-

Suspended Particles (TSP)*1) and PM10		6 months	50 µg/m3	-
	PM10	24 hours	70µg/m3	-
Oxides of nitrogen (NOX) as nitrogen dioxide (NO2)	1 hour		400 µg/m3	200 µg/m³
	24 hours		150µg/m3	25 µg/m3
Carbon monoxide (CO)	15 minutes		100 mg/m3	-
	30 minutes		60 mg/m3	-
	1 hour		30 mg/m3	-
	8 hours		10 mg/m3	-
	24 hours		-	4 mg/m3
Dust fall	30 days		7.5 tonnes/km2	-
Ozone	8-hours		-	100 µg/m3
Lead (Pb)*3	1 year			0.5 µg/m3

Methodology: Sampling was conducted at multiple points across the site using portable air quality monitors (Temtop Paticles Detector – M2000C) to measure Particulate Matter (PM10 and PM2.5), and gaseous emissions (NOx, SOx, CO). Measurements were taken during both peak traffic and calm periods to account for daily variations.

Table 11 Air Quality Results

Parameter	Rongxing Industrial Zone	Luela Residential Zone	Kitwe-Mufurila Roadside Zone	New project site	ZEMA Standards	WHO Standards
PM10 (µg/m³)	8.9	7.2	44.7	6.3	150 µg/m³	75 µg/m³
PM2.5 (µg/m³)	7.5	6.1	27.7	5.3	125 µg/m³	150 µg/m³
TSP (µg/m³)	48.9	9.2	102.3	9.3	120 µg/m³	-
CO	Not detected	Not detected	Not detected	Not detected	10 mg/m³	-
NOx	Not detected	Not detected	Not detected	Not detected	-	200 µg/m³
SO_2	Not detected	Not detected	Not detected	Not detected	125 µg/m³	125 µg/m³

Interpretation:

Ambient air quality was assessed at four locations representing industrial, residential, traffic-influenced, and project-site environments. The results show clear spatial variation, largely influenced by land use and activity intensity.

PM_{10} concentrations were highest along the Kitwe–Mufulira Roadside Zone (44.7 µg/m³), reflecting heavy traffic and resuspended road dust. Lower concentrations were recorded in the Rongxing Industrial Zone (8.9 µg/m³) and Luela Residential Zone (7.2 µg/m³), while the new project site recorded the lowest level (6.3 µg/m³). All values comply with ZEMA standards, although the roadside location exceeds the more stringent WHO guideline, indicating localized traffic-related dust impacts.

$PM_{2.5}$ followed a similar pattern, with the highest concentration recorded at the roadside (27.7 µg/m³) and progressively lower concentrations at the industrial (7.5 µg/m³), residential (6.1 µg/m³), and project site (5.3 µg/m³). All measurements are within both ZEMA and WHO guideline values, suggesting acceptable baseline conditions for fine particulates.

Total Suspended Particulates (TSP) were highest at the roadside (102.3 µg/m³) and in the industrial zone (48.9 µg/m³), consistent with vehicular movement and industrial activity. Residential and project site concentrations were low and comparable (9.2–9.3 µg/m³). All TSP levels comply with applicable regulatory limits.

Gaseous pollutants (CO, NO_x, SO_2) were not detected at any monitoring location, indicating negligible baseline concentrations and full compliance with ambient air quality standards.

Overall, the results indicate good baseline air quality at the proposed project site, with elevated particulate levels confined to traffic-dominated areas. The project will therefore be implemented in an environment with relatively low baseline air pollution, providing a sound reference for assessing and managing future project-related air quality impacts. Since baseline monitoring was conducted in the rainy season (albeit on a dry day), measured concentrations are considered conservative but representative of typical operating conditions.

Air Quality Dispersion Estimation

(Gaussian Dispersion – SCREEN3 Style)

Objective

To estimate the downwind dispersion of PM_{10} and $PM_{2.5}$ from the Rong Xing processing plant under both dry-season and wet-season conditions, noting that baseline monitoring was conducted during the rainy season but on a dry day, which represents a conservative intermediate condition.

Modelling Assumptions

Common Assumptions (Both Seasons)

- **Source Type:** Ground-level fugitive dust (material handling, plant operations, internal roads)
- **Emission Height (H):** 2 m
- **Terrain:** Flat to gently undulating
- **Receptors:** Ground-level sensitive receptors
- **Model Type:** Screening-level Gaussian (SCREEN3-style)

Dry Season (Worst-Case Dispersion)

- **Wind Speed (u):** ~2.78 m/s (≈10 km/h)
- **Atmospheric Stability:** Neutral to slightly unstable (Class C–D)
- **Mixing Height:** ~1,000 m

- **Dust Suppression:** Minimal natural suppression

Wet Season (Typical Baseline Context)

- **Wind Speed:** Slightly lower on average
- **Atmospheric Stability:** Neutral (Class D)
- **Mixing Height:** Reduced due to cloud cover
- **Dust Suppression:** Enhanced due to soil moisture and rainfall scavenging
- **Expected Effect:** 30–60% reduction in fugitive dust emissions compared to dry season

Source Concentrations Used

- **PM_{10} (Industrial Zone, worst baseline):** 8.9 µg/m³
- **$PM_{2.5}$ (Industrial Zone, worst baseline):** 7.5 µg/m³

These values represent conservative baseline source-area concentrations.

Dispersion Formula (Simplified Gaussian Decay)

For screening purposes, downwind concentration decay is approximated using an exponential attenuation function consistent with Gaussian plume behaviour:

$$C(x) = C_0 \cdot e^{-kx}$$

Where:

- $C(x)$= concentration at distance x(mg/m³)
- C_0= concentration at source (mg/m³)
- x= distance downwind (m)
- k= dispersion decay constant (m^{-1})

Assumed decay constants:

- **PM_{10}:** $k = 0.0012$

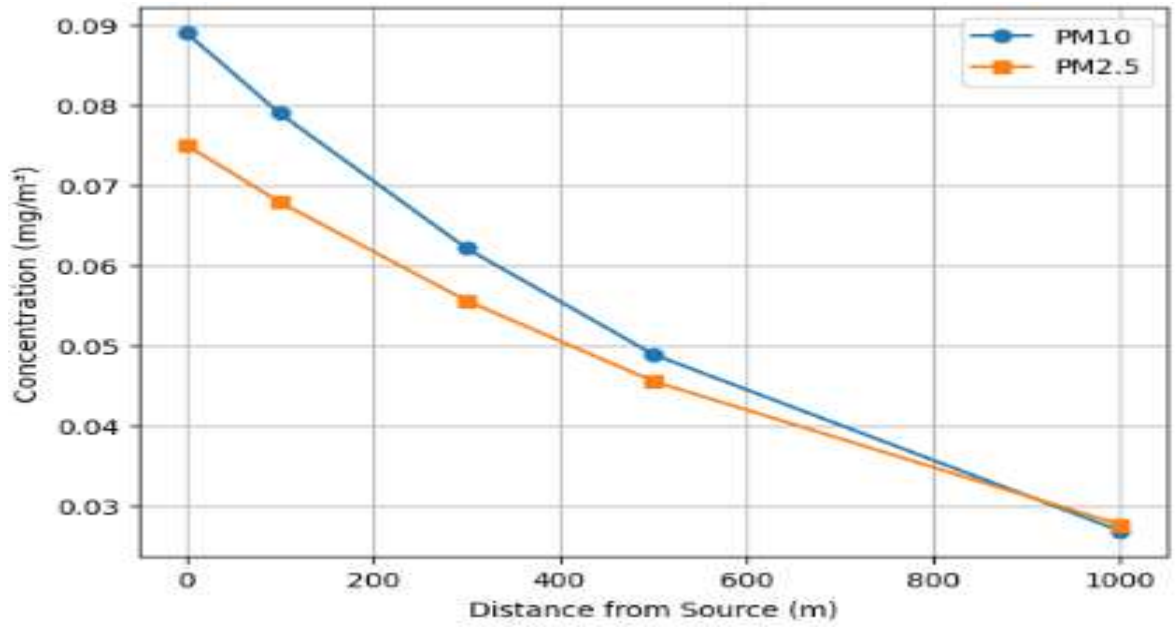
- **$PM_{2.5}$:** $k = 0.0010$

Lower decay for $PM_{2.5}$ reflects finer particle persistence in the atmosphere.

Estimated Particulate Matter Concentration Decay (Dry Season)

Distance from Source	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
0 m	8.9	7.5
100 m	6.5	6.8
300 m	4.5	5.6
500 m	3.5	4.6
1,000 m	2.7	2.8

Figure 8 Estimated Particulate Matter Concentration Decay



Wet-Season Adjustment

During the wet season, natural dust suppression from rainfall and higher surface moisture typically reduces fugitive dust emissions by 30–60%. Applying a conservative 40% reduction factor:

$$C_{wet}(x) = 0.6 \cdot C_{dry}(x)$$

Under wet-season conditions:

- PM_{10} concentrations are expected to fall below WHO guidelines within 100–200 m
- $PM_{2.5}$ concentrations remain compliant with both ZEMA and WHO limits at all distances

Interpretation and Implications

- **PM_{10}:** Under dry-season worst-case conditions, short-term exceedance of the WHO guideline (45.0 µg/m³) may occur within 300–400 m of the source. Under wet-season conditions, such exceedances are unlikely beyond the immediate plant area.
- **$PM_{2.5}$:** Even under dry-season conditions, predicted concentrations decline rapidly and remain within guideline limits beyond the immediate source zone.
- **Seasonality:** Since baseline monitoring was conducted in the rainy season (albeit on a dry day), measured concentrations are considered conservative but representative of typical operating conditions.

5.4 Geology

The project area lies within the Katanga Supergroup of the Central African Copperbelt. The dominant geological units comprise Upper Roan Group sedimentary rocks, including dolomites, shales, and sandstones, which host copper mineralization. These formations are underlain by crystalline Basement Complex rocks.

The geology is structurally characterized by folding, fracturing, and faulting, which influence groundwater occurrence and mineralization. The geological setting is well suited to copper processing activities and is consistent with long-established mining and metallurgical operations in the region.

5.5 Hydrology

The primary hydrological feature relevant to the site is the Luela Stream, located approximately 0.68 km to the west. This stream is a vital tributary that feeds into the Mwambashi Stream and eventually into the broader hydrological setting including the Kafue River system, located several kilometres from the site, and smaller seasonal streams and dambos that become active during the rainy season.

Surface runoff is primarily controlled by rainfall intensity and local topography, with flows directed toward natural drainage lines during the wet season. The absence of permanent surface water bodies within the project footprint reduces direct surface water sensitivity, although downstream receptors remain environmentally relevant

Water Quality Assessment Methodology:

Water quality data was collected to characterize both surface and groundwater sources in the vicinity of the project site. Composite water sample was drawn from Luale stream (Upstream, Midstream and Downstream) to ensure representative coverage of the hydrological environment. Parameters tested included pH, temperature, turbidity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), heavy metals (copper, lead, zinc), nitrates, and Escherichia coli (E. coli).

Sample collection and analysis were carried out in accordance with the ZEMA and ZABs Standard Methods for the Examination of Water and Wastewater. The results were used to determine the existing quality of water resources and assess the risk of contamination from the proposed project activities.

Table 12 Surface Water Results from the project area

Parameter	Unit	Upstream	Midstream	Downstream	Zabs Limits	ZEMA limits
pH	–	6.92	6.88	6.71	6.0 – 8.5	6.0 – 9.0
Turbidity	NTU	5.1	7.4	8.6	5	≤20
Conductivity	µS/cm	342	392	415	3000	≤4300
TSS	mg/l	7	6	7	15	≤100
TDS	mg/l	224	246	258	800	≤3000
DO	mg/l	5.3	5.4	5.6	–	≤5
SO_4	mg/l	10	33	29	250	≤800
PO_4	mg/l	0.10	0.11	0.09	–	≤10
Cl	mg/l	46.8	50.6	53.2	250	≤800
NO_3	mg/l	0.56	0.58	0.53	15	≤45
Fe	mg/l	<0.01	<0.01	<0.01	0.3	≤2.0
Cu	mg/l	0.038	0.051	0.048	1.0	1.5
Co	mg/l	<0.01	<0.01	<0.01	0.05	1
Pb	mg/l	0.024	0.031	0.033	0.05	≤0.5
Mn	mg/l	0.051	0.046	0.048	0.02	1
Zn	mg/l	0.338	0.381	0.395	0.05	1
Ni	mg/l	0.028	<0.01	0.011	0.05	≤0.5
As	mg/l	<0.01	<0.01	<0.01	0.05	≤0.5
Cd	mg/l	<0.01	<0.01	<0.01	0.05	≤0.5
Ca	mg/l	27.4	30.1	29.2	200	500
Mg	mg/l	11.7	11.9	12.4	30	500
Total Hardness	mg/l	116	121	120	–	500
Faecal Coliform	Cfu/100	52	41	47	0	≤500
Total Coliform	Cfu/100	138	196	322	0	≤25,000
Oil & Grease	mg/l	<0.01	<0.01	<0.01	0	≤5000
T. Hydrocarbon	mg/l	<0.01	<0.01	<0.01	0	≤10

Findings:

Surface water samples collected upstream, midstream, and downstream of the project area indicate generally good water quality and compliance with both ZABS and ZEMA guideline limits.

The pH values (6.71–6.92) fall within acceptable ranges, indicating neutral to slightly acidic conditions typical of natural surface waters. Turbidity shows a gradual increase downstream (5.1 to 8.6 NTU) but remains well below the ZEMA limit, suggesting minor sediment input without significant disturbance. Electrical conductivity, TDS, and TSS levels are low across all sampling points, reflecting limited dissolved and suspended solids and no evidence of salinity or sediment pollution.

Dissolved oxygen (DO) concentrations range from 5.3 to 5.6 mg/l, indicating well-oxygenated conditions capable of supporting aquatic life. Major ions, including sulphates, chlorides, nitrates, and phosphates, are present at low concentrations and remain far below regulatory thresholds, suggesting no nutrient enrichment or contamination from anthropogenic sources.

Trace metals such as iron, copper, cobalt, lead, manganese, zinc, nickel, arsenic, and cadmium were either below detection limits or well within permissible limits. Although manganese and zinc marginally exceed ZABS guideline values, they remain comfortably within ZEMA limits and are likely influenced by natural geochemical background rather than site-specific pollution.

Microbiological indicators (faecal and total coliforms) are present at low levels and comply with ZEMA limits, indicating minimal sanitary contamination. Oil, grease, and total hydrocarbons were below detection limits at all locations, confirming the absence of petroleum-related pollution

5.6 Hydrogeology

The project area is underlain by fractured sedimentary aquifers associated with the Upper Roan Group. Groundwater occurs mainly within fractures, joints, and bedding planes. Borehole yields in the area typically range from approximately 1 to 20 litres per second, with higher yields locally where fracturing is well developed. Groundwater is a critical resource for local communities, serving as the primary source of domestic water through boreholes and wells. Baseline groundwater quality is generally within acceptable limits for domestic and industrial use, though naturally elevated mineral content is common due to the copper-rich geology. Given the reliance on groundwater, the hydrogeological environment is considered environmentally sensitive.

Water Quality Assessment Methodology:

Water quality data was collected to characterize groundwater sources in the vicinity of the project site. Composite water sample was drawn from RongXing Plant Site borehole to ensure representative coverage of the hydrological environment. Parameters tested included pH, temperature, turbidity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), heavy metals (copper, lead, zinc), nitrates, and Escherichia coli (E. coli).

Sample collection and analysis were carried out in accordance with the ZEMA and ZABs Standard Methods for the Examination of Water and Wastewater. The results were used to determine the existing quality of water resources and assess the risk of contamination from the proposed project activities

Table 13 Ground Water Results from the project area

Parameter	Unit	Results	ZEMA limits
pH	–	6.89	6.0 – 9.0
Turbidity	NTU	12.0	≤20
Conductivity	µS/cm	214	≤4300
TSS	mg/l	52	≤100
TDS	mg/l	121	≤3000
DO	mg/l	4.9	≤5
SO_4	mg/l	49	≤800
PO_4	mg/l	0.07	≤10
Cl	mg/l	30.1	≤800
NO_3	mg/l	1.31	≤45
Fe	mg/l	<0.01	≤2.0
Cu	mg/l	0.052	1.5
Co	mg/l	0.028	1
Pb	mg/l	0.036	≤0.5
Mn	mg/l	0.067	1
Zn	mg/l	0.369	1
Ni	mg/l	<0.01	≤0.5
As	mg/l	<0.01	≤0.5
Cd	mg/l	<0.01	≤0.5
Ca	mg/l	12.1	500
Mg	mg/l	5.6	500
Total Hardness	mg/l	55	500
Faecal Coliform	Cfu/100	6	≤5000
Total Coliform	Cfu/100	28	≤25,000
Oil & Grease	mg/l	<0.01	≤5000
T. Hydrocarbon	mg/l	<0.01	≤10

Findings:

Groundwater results from the project area indicate good overall water quality in compliance with applicable ZEMA guideline limits.

The pH value of 6.89 falls within the acceptable range, indicating near-neutral conditions typical of natural groundwater. Turbidity, TSS, conductivity, and TDS levels are all low and well below regulatory limits, reflecting minimal suspended solids and low mineralization, with no indication of salinity or particulate contamination.

Dissolved oxygen (DO) measured at 4.9 mg/l is within the acceptable limit and suggests moderately oxygenated groundwater conditions. Major anions, including sulphates, chlorides, nitrates, and

phosphates, are present at low concentrations, indicating no nutrient loading or contamination from industrial, agricultural, or domestic sources.

Trace metals such as iron, copper, cobalt, lead, manganese, zinc, nickel, arsenic, and cadmium are either below detection limits or well within ZEMA standards. The observed concentrations are consistent with natural background levels and do not indicate groundwater contamination related to mining or processing activities.

Hardness, calcium, and magnesium values are low, classifying the groundwater as soft and suitable for most domestic and industrial uses. Microbiological indicators (faecal and total coliforms) are present at very low levels and comply with ZEMA limits, suggesting minimal sanitary influence. Oil, grease, and total hydrocarbons were below detection limits, confirming the absence of petroleum-related contamination.

5.7 Topography

The project area is situated on gently undulating terrain characteristic of the central Copperbelt plateau, with elevations ranging from approximately 1,200 to 1,260 metres above mean sea level. The landform is dominated by broad, shallow slopes interspersed with minor depressions that act as seasonal drainage pathways during the rainy season. Slope gradients are generally low, typically less than 5%, and do not present significant constraints to construction or industrial operations.

The absence of steep slopes or escarpments indicates a low susceptibility to landslides or mass movement processes. Natural drainage occurs through sheet flow and shallow channels that convey runoff toward regional catchments. Under baseline conditions, erosion rates are low due to the gentle topography and vegetative cover. However, localized erosion could occur if surface soils are exposed during construction, particularly during high-intensity rainfall events. Overall, the topography is considered suitable for the proposed industrial development, provided that appropriate surface water management and erosion control measures are implemented.

5.8 Soils

Baseline soil investigations indicate that soils within the project area are predominantly clay loams and sandy clay loams derived from the weathering of basement complex rocks. These soils are generally moderately deep, with a well developed profile consisting of a thin topsoil layer overlying a more compact subsoil horizon. Soil texture supports moderate permeability, allowing infiltration of rainfall while limiting rapid percolation.

From a sensitivity perspective, the soils are moderately vulnerable to erosion and compaction if vegetation is removed or heavy machinery is operated without controls. Disturbance of topsoil could reduce fertility and increase sediment runoff into nearby drainage channels. Consequently, soil stripping, stockpiling, and reinstatement will require careful management during site preparation and construction.

Soil Baseline Assessment

Methodology

Baseline soil sampling for the RongXing Project Area was undertaken to establish existing soil quality conditions prior to the proposed expansion and technical renovation. Soil samples were collected from representative locations corresponding to key project components and infrastructure to capture spatial variability related to planned land use.

Sampling points were selected as follows:

- **SP–PP1:** Proposed Processing Plant Area
- **SP–PP2:** Proposed Processing Plant Area
- **SP–PP3:** Proposed Processing Plant Area
- **SP–PP4:** Proposed Processing Plant Area

At each sampling point, surface soil samples were collected from a depth of 0–20 cm using clean, non-reactive sampling tools to avoid contamination. Samples were labelled, preserved, and transported to an accredited laboratory for analysis.

The following parameters were analysed:

Soil pH to determine acidity or alkalinity and potential influence on metal mobility; soil texture to assess proportions of sand, silt, and clay and their effect on drainage and contaminant retention; organic matter content to evaluate soil fertility and biological activity; and selected heavy metals, including copper (Cu), lead (Pb), zinc (Zn), cadmium (Cd), and arsenic (As), to assess baseline metal concentrations associated with historical mining influence in the area.

Table 14 Soil Sample Results

Parameter	SP–PP1	SP–PP2	SP–PP3	SP–PP4
Soil pH	6.4	6.7	7.0	7.2
Soil Texture	Sandy Loam	Loamy Sand	Silty Clay Loam	Clay
Organic Matter (%)	2.6	3.0	4.2	4.6
Copper (Cu) (mg/kg)	75	82	115	125
Lead (Pb) (mg/kg)	9	11	17	19
Zinc (Zn) (mg/kg)	48	54	70	78
Cadmium (Cd) (mg/kg)	0.4	0.6	0.9	1.0
Arsenic (As) (mg/kg)	0.7	0.9	1.4	1.7

Findings:

Soil pH:

Soil pH values range from 6.4 to 7.2, indicating slightly acidic to neutral conditions across the site. These conditions are typical of Copperbelt soils and are favourable for industrial development, with no indication of extreme acidity or alkalinity that could significantly influence metal mobility.

Soil Texture:

Soils transition from coarser textures (sandy loam and loamy sand) in the processing plant areas (SP–PP1 and SP–PP2) to finer textures (silty clay loam and clay) in SP–PP3 and SP–PP4. This suggests better drainage but higher erosion susceptibility in processing areas, and higher moisture and metal retention potential in areas associated with tailings-related components.

Organic Matter:

Organic matter content increases from 2.6–3.0% in processing areas to 4.2–4.6% in SP–PP3 and SP–PP4, reflecting lower disturbance and greater vegetative input. Higher organic matter enhances soil structure but may also increase metal binding capacity.

Copper (Cu):

Copper concentrations increase from 75–82 mg/kg in SP–PP1 and SP–PP2 to 115–125 mg/kg in SP–PP3 and SP–PP4. This pattern is consistent with proximity to mineralised or tailings-influenced zones and reflects typical baseline conditions for Copperbelt mining areas.

Lead (Pb) and Zinc (Zn):

Lead and zinc concentrations are low to moderate across all sampling points, with slightly elevated values in SP–PP3 and SP–PP4. These levels are within expected background ranges for mining-influenced soils and do not indicate significant contamination.

Cadmium (Cd) and Arsenic (As):

Cadmium and arsenic concentrations are low across the site, with marginally higher values in SP–PP3 and SP–PP4. The recorded levels are within typical baseline ranges and do not pose immediate environmental concern under existing conditions.

5.9 Land Use and Land Tenure

Land use within the project area and its immediate surroundings reflects a combination of industrial, agricultural, and semi-natural uses. The project site itself is located within an established industrial zone and is held under legal title by the project proponent, providing secure land tenure and eliminating the risk of land ownership disputes. Surrounding areas are predominantly used for subsistence agriculture, including small-scale crop cultivation and seasonal farming activities, as well as secondary woodland that has regenerated following historical clearing. Scattered residential settlements occur beyond the immediate project footprint, typically associated with farming activities. There are no protected areas, conservation zones, or culturally restricted lands within or adjacent to the project site. The land use context is therefore considered compatible with industrial development, and the proposed project does not conflict with existing land tenure arrangements or legally protected land uses.

5.10 Built Environment

The built environment in the vicinity of the project area is sparsely developed and reflects a transitional zone between industrial and rural land uses. Existing infrastructure includes industrial facilities, access roads, power supply lines, and limited service buildings associated with ongoing operations. Residential structures are scattered and typically located at a distance from the core industrial area.

Key landmarks in proximity include Luela Primary school, Lifesong Twalima Farm, positioned 2.04 km south-east of the plant, and Luongo SDA Church, located approximately 1.5 km east of the plant. The Sabina Central Police checkpoint, situated 3.5 km south the screening plant, provides essential security services to the area. Industrially, the plant is strategically positioned 7.07 km south-east of the NFC Africa Copper Mine, a major copper production facility, underscoring the region's focus on mining and mineral processing.

5.11 Noise and Vibration

Baseline noise and vibration surveys were conducted at representative locations within and around the project area, coinciding with air quality sampling points. Measured ambient noise levels were consistently below 55 dB(A) for areas with residential characteristics and below 70 dB(A) for industrial settings, in accordance with IFC Environmental, Health and Safety Guidelines and applicable Zambian standards.

Existing noise sources include vehicular traffic on nearby roads, intermittent industrial activity, and routine human activities. Noise levels are generally steady and do not exhibit significant fluctuations. Vibration measurements recorded low acceleration values, indicating minimal ground vibration under baseline conditions. No vibration-sensitive receptors such as hospitals, schools, or heritage structures are located within the immediate vicinity of the project site.

Baseline noise and vibration conditions are therefore considered acceptable and suitable for the proposed industrial expansion, provided that operational noise controls are implemented where necessary.

Noise Measurement Methodology:

- **Equipment used:** A Sound level meter (Casella CEL24X) was used to measure noise levels at four key locations around the mine site.

- **Measurement conditions:** Measurements were taken during operational hours and off-peak times to determine both peak and ambient noise levels.
- **Standard used:** Noise levels were compared against the World Health Organization (WHO) and Zambia Environmental Management Agency (ZEMA) noise standards.

Measured Noise levels

Table: Baseline Daytime Noise Levels

Sampling Point	Location Description	LAeq Daytime dB(A)	Applicable Guideline dB(A)
NM–1	Rongxing Industrial Zone	64	70 (Industrial)
NM–2	Luela Residential Zone	49	55 (Residential)
NM–3	Kitwe–Mufurila Roadside Zone	66	70 (Commercial/Roadside)
NM–4	New Project Site	58	70 (Industrial)

Interpretation of Noise Results (Concise)

Baseline noise levels range from 49 to 66 dB(A) across the monitored locations. The highest levels occur along the Kitwe–Mufurila Roadside Zone and within the Rongxing Industrial Zone, reflecting traffic flow and existing industrial activity; both remain below applicable industrial/commercial limits. The Luela Residential Zone records lower ambient noise and complies with the 55 dB(A) residential guideline, indicating limited disturbance. Noise levels at the New Project Site are moderate and consistent with a semi-industrial setting, remaining within acceptable limits for industrial development. Overall, baseline acoustic conditions are compliant and suitable for the proposed project.

Noise Propagation Estimation (ISO 9613-2–Based)

Objective

Estimate how far measured baseline noise levels may propagate from each monitored location and compare predicted levels against ZEMA and WHO community annoyance thresholds.

Input baseline levels (daytime LAeq)

- Rongxing Industrial Zone: 64 dB(A)
- Luela Residential Zone: 49 dB(A)
- Kitwe–Mufulira Roadside Zone: 66 dB(A)
- New Project Site: 58 dB(A)

Thresholds used for screening

- WHO annoyance (outdoor, daytime): 55 dB(A)
- WHO night sleep disturbance (outdoor): 45 dB(A)
- ZEMA guideline (typical): 55 dB(A) residential day; 70 dB(A) industrial/commercial day (Used here as benchmark criteria for receptors and industrial areas.)

ISO 9613-2 screening model and assumptions

ISO 9613-2 predicts sound pressure level at a receptor as:

$$L_p(r) = L_w + D_c - A(r)$$

Where attenuation $A(r)$is the sum of contributions:

$$A = A_{\text{div}} + A_{\text{atm}} + A_{\text{gr}} + A_{\text{bar}} + A_{\text{misc}}$$

For a screening-level estimate (typical in baseline chapters), we use a relative form based on a measured reference level L_0at distance r_0, and include only the dominant, defensible terms:

$$L_p(r) = L_0 - 20\log_{10}\left(\frac{r}{r_0}\right) - \alpha(r - r_0)$$

Assumptions (conservative, ISO 9613-2 consistent):

1. Point-source approximation for each location (screening).
2. Hemispherical spreading over ground (reflected ground plane embedded in the 20log term via relative formulation).
3. Favourable propagation conditions (downwind / slight inversion), which ISO 9613-2 treats as conservative for community impact screening.
4. No barriers (no walls/berms/buildings counted), so $A_{bar} = 0$.
5. Ground attenuation neglected at screening stage ($A_{gr} \approx 0$) to avoid underestimating distances.
6. Atmospheric absorption included as a small correction, with $\alpha = 0.005$ dB/m(≈ 5 dB/km; typical mid-frequency, warm humid conditions). If you prefer an even more conservative result, set $\alpha = 0$.

Reference distance: $r_0 = 10$ m(typical environmental measurement reference around a dominant source zone). Distances below are therefore "from the measurement zone outward".

Estimated propagation distances to key thresholds (daytime)

Using the geometric spreading term (and noting atmospheric absorption slightly reduces distances), the distance to a threshold $L_T$is approximately:

$$r \approx r_0 \times 10^{\frac{(L_0 - L_T)}{20}}$$

Table 15 Results (approximate distances from each location)

Location (L0 at 10 m)	**Distance to 55 dB(A) (WHO/ZEMA residential day)**	**Distance to 45 dB(A) (WHO night)**
Rongxing Industrial Zone (64 dB(A))	~**28 m**	~**89 m**
Kitwe–Mufulira Roadside Zone (66 dB(A))	~**36 m**	~**112 m**
New Project Site (58 dB(A))	~**14 m**	~**45 m**
Luela Residential Zone (49 dB(A))	Already **<55 dB(A)** at 10 m	~**16 m**

Interpretation (brief):

Under conservative ISO 9613-2 screening assumptions, baseline noise in the industrial/roadside zones would typically attenuate below the 55 dB(A) daytime annoyance threshold within ~14–36 m, and below 45 dB(A) within ~45–112 m, assuming no barriers and favourable propagation. The Luela residential baseline is already below the 55 dB(A) criterion at the monitoring point, indicating comparatively quiet baseline conditions.

5.12 Fauna

The fauna of the RongXing project area reflects a **disturbed miombo woodland and semi-industrial environment** that has been subject to prolonged human activity, including agriculture, settlement expansion, and industrial operations. As a result, the diversity and abundance of wildlife are limited, with the fauna assemblage dominated by **small, disturbance-tolerant species**. Large mammals are absent, primarily due to habitat fragmentation, noise, and human presence. The recorded fauna are typical of the Copperbelt region and are adapted to open woodland, grassland, and anthropogenically modified habitats.

Terrestrial Fauna

Field surveys recorded small mammals, reptiles, amphibians, and invertebrates commonly associated with disturbed environments. These species play basic ecological roles such as seed dispersal, insect control, and soil aeration but do not represent sensitive or conservation-critical fauna.

Table 16 Terrestrial Fauna Recorded in the Project Area

Common Name	Scientific Name	Habitat / Remarks
Common Mouse	*Mus musculus*	Human-influenced areas
Multimammate Rat	*Mastomys natalensis*	Grassland and farmland
African Grass Rat	*Arvicanthis niloticus*	Cultivated land
Agama Lizard	*Agama agama*	Open disturbed areas
Striped Skink	*Trachylepis striata*	Woodland floor
African Common Toad	*Sclerophrys regularis*	Seasonal wetlands
Termites	*Macrotermes* spp.	Soil mounds
Ants	*Formicidae* spp.	Widespread

Aquatic Fauna

Aquatic fauna within the project area is minimal and seasonal**,** as no permanent rivers, streams, or wetlands occur within the project footprint. During the rainy season, temporary pools and drainage channels may support limited aquatic life such as amphibians and aquatic insects.

Table 17 Aquatic Fauna Recorded

Common Name	Scientific Name	Habitat / Remarks
Frog Tadpoles	*Anura* spp.	Temporary rain pools
Aquatic Insects	*Hemiptera* spp., *Coleoptera* spp.	Seasonal streams

No fauna species listed as rare, threatened, or endangered under the IUCN Red List were recorded in the project area.

5.13 Avifauna

The avifauna of the RongXing project area is composed mainly of common and widespread bird species associated with miombo woodland, open grassland, farmland, and human settlements. Bird diversity is moderate and reflects the disturbed nature of the habitat. Most recorded species are tolerant of noise and human activity and are frequently observed in industrial and peri-urban environments across the Copperbelt.

Table 18 Avifauna Recorded in the Project Area

Common Name	Scientific Name	Habitat / Remarks
Laughing Dove	*Spilopelia senegalensis*	Open woodland, settlements
Red-eyed Dove	*Streptopelia semitorquata*	Miombo woodland
Speckled Pigeon	*Columba guinea*	Rocky and urban areas
Village Weaver	*Ploceus cucullatus*	Trees and woodland edges
African Palm Swift	*Cypsiurus parvus*	Open areas
Common Bulbul	*Pycnonotus barbatus*	Woodland and gardens
Pied Crow	*Corvus albus*	Disturbed areas
Fiscal Shrike	*Lanius collaris*	Farmland and woodland

No endemic, rare, or endangered bird species were identified during the baseline survey, and no Important Bird Areas (IBAs) occur within or near the project site.

5.14 Flora

The flora of the RongXing project area consists predominantly of secondary miombo woodland, which has regenerated following historical clearing for agriculture and industrial activities. Vegetation structure is generally open, with mature trees interspersed with shrubs and grasses. Species composition reflects typical Copperbelt miombo vegetation and is dominated by hardy, fast-regenerating species.

Terrestrial Flora

The woodland is characterised by miombo indicator species, with a grass-dominated understorey adapted to periodic disturbance and seasonal fires. Vegetation within the project footprint has low to moderate ecological value and does not include protected or conservation-significant plant species.

Table 19 Terrestrial Flora Recorded in the Project Area

Common Name	Scientific Name	Habitat / Remarks
Msasa	*Brachystegia spiciformis*	Dominant miombo species
Mutobo	*Julbernardia paniculata*	Miombo woodland
Mubanga	*Brachystegia longifolia*	Woodland
Masuku	*Uapaca kirkiana*	Woodland and disturbed areas
Mobola Plum	*Parinari curatellifolia*	Open woodland
African Blackwood (saplings)	*Dalbergia melanoxylon*	Scattered
Guinea Grass	*Panicum maximum*	Open disturbed ground
Couch Grass	*Cynodon dactylon*	Cleared areas

Aquatic Flora

The Luela Stream supports a narrow but ecologically important riparian vegetation corridor that contrasts with the surrounding secondary miombo woodland and industrial land uses. Vegetation along the stream banks is influenced by higher soil moisture availability, periodic inundation during the rainy season, and finer alluvial soils. This results in the establishment of hydrophilic grasses, sedges, reeds, shrubs, and selected tree species adapted to seasonally waterlogged conditions.

The riparian zone provides important ecological functions, including bank stabilisation, sediment trapping, nutrient cycling, and habitat provision for aquatic and semi-aquatic fauna. Although the

Luela Stream is subject to anthropogenic pressure from upstream activities and nearby settlements, its vegetation remains representative of disturbed but functional Copperbelt stream ecosystems. No rare or protected aquatic plant species were observed, and the flora present is generally common and widespread.

Table 20 Aquatic Flora Recorded Along Luela Stream

Common Name	Scientific Name
Common Reed	*Phragmites australis*
Bulrush / Cattail	*Typha capensis*
Papyrus Sedge	*Cyperus papyrus*
Umbrella Sedge	*Cyperus alternifolius*
Water Grass	*Echinochloa pyramidalis*
Common Rush	*Juncus effusus*
Wild Date Palm	*Phoenix reclinata*
Water Berry	*Syzygium cordatum*
African Fig	*Ficus sycomorus*
Floating Pondweed	*Potamogeton* spp.

Ecological Baseline Sensitivity Summary

The ecological environment of the RongXing project area is assessed as low to moderate sensitivity. Habitats are already disturbed, biodiversity is limited, and no protected species or ecosystems are present. The ecological baseline therefore indicates that the area **is** suitable for industrial expansion, provided that standard mitigation measures such as vegetation clearance control, erosion management, and progressive rehabilitation are implemented.

5.15 Archaeological and Cultural Environment

A baseline assessment of the archaeological and cultural environment within the RongXing project area was undertaken through site reconnaissance and reference to available heritage records. The project area is located within an established industrial zone that has been subject to long-term disturbance from mining, industrial, and agricultural activities.

No known archaeological sites, historical monuments, graves, shrines, or culturally significant features were identified within the project footprint or its immediate surroundings. The area is not associated with recognised traditional ceremonial grounds or sites of spiritual importance to local communities. Cultural practices observed in nearby settlements are typical of the wider Kalulushi District and do not have a direct spatial linkage to the project site.

5.16 Socio-Economic Setup

The socio-economic environment of the RongXing project area reflects the broader development context of the Chambishi–Kalulushi corridor, which is experiencing gradual transition from a peri-urban setting to a more industrialised landscape. This transition is driven by proximity to Kitwe's urban centre, expansion of mining and mineral processing activities, and the gradual improvement of transport and service infrastructure. As a result, the area supports a mixed livelihood system combining formal employment, informal economic activities, and subsistence practices.

Local communities in the vicinity of the project area derive livelihoods mainly from mining-related employment, small-scale farming, informal trading, transport services, and other support activities linked to industrial operations. Cultural traditions remain influential in shaping community organisation and social relations, with traditional leadership structures continuing to play an important role alongside formal government institutions. Meaningful community engagement and inclusive decision-making processes are therefore essential for fostering social acceptance of the project and ensuring that cultural values and expectations are respected.

5.16.1 Population Distribution

Chambishi is a town located within Kalulushi District of the Copperbelt Province. According to the 2022 National Census, the population of Chambishi stands at approximately 34,888 people (source: city population). Settlement patterns in the area are characterised by clustered residential zones interspersed with industrial and mining facilities, reflecting the mining-driven nature of the local economy. Population density is moderate, with gradual in-migration associated with employment opportunities in mining, processing, and related service sectors.

5.16.2 Economic Activities

The economy of the project area and its surroundings is predominantly mining-driven, with copper mining, processing, and associated support services forming the backbone of local economic activity. Employment opportunities are concentrated in mining operations, mineral processing plants, transport and logistics, equipment maintenance, construction, and security services. Subsistence agriculture remains important for household food security, particularly in peri-urban and fringe areas, while informal trading and small businesses provide supplementary income for many households.

5.16.3 Administration

The project site, located in the Sabina area of Chambishi, falls under the administrative jurisdiction of Kalulushi District. Governance is exercised through a combination of formal municipal authorities, including the Kalulushi Municipal Council, and traditional leadership structures at community level. This governance framework provides oversight for land administration, development control, and delivery of public services.

All development activities associated with the proposed expansion of the copper processing facility are required to comply with applicable local by-laws, planning regulations, and national policies. Continuous engagement with district authorities, ward leadership, and community representatives is important to support coordinated development and alignment with local socio-economic priorities.

5.16.4 Health

Health infrastructure within the Sabina area and surrounding communities is relatively limited, with access largely confined to primary healthcare facilities. More specialised medical services are typically accessed in Kalulushi town or Kitwe. Increased industrial activity associated with the project may lead to increased population movement and workforce demand, potentially placing additional pressure on existing health services. The project therefore presents an opportunity to contribute positively to local health outcomes through corporate social responsibility initiatives, such as support to health outreach programmes, strengthening of local clinics, or health education and awareness activities. Such measures would help manage potential health-related impacts associated with increased employment and economic activity.

5.16.5 Education

The Chambishi, Kalulushi District and its surrounding region host several educational institutions, including Zambia Catholic University, offering programmes in business, education, and IT; Kalulushi College of Nursing (KCN), providing nursing training; and Chibuluma College of Health Sciences, offering specialised health-related courses. In addition, primary schools including Luela Primary School and secondary schools serve the local community, supporting foundational education.

These institutions are critical for local skills development and offer opportunities for collaboration with the project, such as vocational training, internships, and workforce capacity-building, particularly for operations at the proposed copper processing facility. The presence of these educational facilities represents a valuable community asset and contributes to the region's long-term socio-economic development.

5.16.6 Ethnic Groups in the Area

The Sabina area of Chambishi, Kalulushi District is home to a diverse population, predominantly comprising the Bemba, Lamba, and other ethnic groups. Local languages, cultural practices, and traditions are actively observed and respected within the community.

Development activities, including the proposed copper processing facility, should adopt culturally sensitive approaches to land access, community engagement, and corporate social responsibility (CSR) initiatives. Recognising and respecting local heritage and customs will help ensure positive community relations and sustainable project implementation.

5.16.7 Land Ownership and Land Tenure

Land tenure in Chambishi, Kalulushi District, Copperbelt Province, is characterised by a mix of state leasehold, municipal-controlled land, mining concessions, and rapidly expanding peri-urban residential areas, some of which may involve informal or disputed ownership. Most urbanised land is under the control of the Kalulushi Municipal Council (KMC) or the State, which actively creates and allocates residential, commercial, and church plots.

Within the project area, land is primarily designated for industrial use or urban expansion, though customary arrangements and community interests may also exist. Land acquisition and development processes must therefore be inclusive, transparent, and carefully coordinated. The project developer will need to engage with both local government authorities and traditional leaders to ensure clear land rights, prevent disputes, and respect existing tenure arrangements.

6.0 ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 Biophysical Environment

6.1.1 Positive Impacts

Enhanced Ore Recovery Efficiency and Waste Reduction

Impact:

The integration of high-pressure acid curing, wet screening, and multi-stage agitation leaching will significantly improve mineral liberation and leaching kinetics for low-grade tailings and overburden oxide ore. This process enhancement will maximise copper recovery while reducing residual waste volumes, minimising raffinate losses, and improving overall process efficiency within the SX–EW circuit. Optimised recovery will also reduce the need for additional raw material inputs and lower long-term environmental liabilities associated with tailings management.

Enhancement Measures:

- Routine calibration and optimisation of the acid curing system: Rong Xing Investment Limited will routinely calibrate curing drums, mixers, conveyors, and associated monitoring sensors to maintain optimal acid dosing, moisture content, and curing residence time throughout operation.
- Automation and process control: RongXing will incorporate Programmable Logic Controllers (PLC) and SCADA systems to ensure accurate acid dosing, controlled curing conditions, and predictable metallurgical responses, thereby minimising chemical wastage and process variability.
- Efficient raffinate and process solution management: RongXing will ensure process solutions is managed within engineered, bunded, and lined systems integrated into the SX–EW circuit to prevent losses and uncontrolled discharge.
- Maximised internal recycling of process solutions: RongXing will ensure the project operate closed-loop process water and solution recycling systems to reduce freshwater abstraction and minimise effluent generation.
- Continuous process monitoring: RongXing will ensure key parameters including pH, flow rates, conductivity, and solution strength are monitored in real time, with alarms and corrective protocols to prevent spills, over-acidification, or system failures.

Reduction of Ore Wastage and Acid Consumption

Impact:

By ensuring that only properly cured and screened material enters the leaching circuit, the project

will optimise acid to ore contact and leaching efficiency. This controlled feed strategy will significantly reduce sulfuric acid over-consumption, minimise unreacted residues, and lower overall waste generation. Improved reagent efficiency will enhance copper recovery from low-grade tailings and overburden while reducing operational costs and the environmental risks associated with excess acid handling and disposal.

Enhancement Measures:

- Process optimisation and performance auditing: Rong Xing Investment Limited will conduct routine process optimisation audits, including benchmarking sulfuric acid consumption per tonne of ore treated against recognised hydrometallurgical industry standards, to ensure continuous efficiency improvement.
- Automated and controlled acid dosing: RongXing will ensure acid addition is controlled through PLC-based dosing systems linked to real-time monitoring of pH, slurry density, and metal tenor, ensuring precise stoichiometric dosing and preventing over-acidification.
- Operator training and competency development: RongXing will ensure plant operators receive targeted training on stoichiometric dosing principles, reagent efficiency, and chemical loss prevention to minimise wastage and improve metallurgical performance.
- Feedback-driven process adjustments: RongXing will ensure data from leaching performance, raffinate strength, and recovery trends is routinely analysed to fine-tune curing and leaching parameters, ensuring consistent reduction in ore and reagent losses.

Reduced Pressure on Primary Ore Deposits

Impact:

The project's reliance on reclaimed tailings and overburden oxide ore as primary feedstock will significantly reduce the need for extraction of virgin ore from undeveloped mineral deposits. By recovering copper from historical waste materials, the project promotes resource efficiency, circular use of minerals, and conservation of untouched geological resources, while also contributing to the remediation of legacy mining impacts associated with abandoned tailings and waste rock dumps.

Enhancement Measures:

- Responsible sourcing agreements: Rong Xing will establish formal Memoranda of Understanding (MoUs) with approved mine operators for the responsible sourcing of tailings and overburden materials, ensuring that material recovery does not create new environmental or social liabilities at source locations.

- Environmental monitoring of source materials: RongXing will be conducting baseline characterisation and periodic monitoring of sourced tailings and waste rock to assess potential environmental risks, including metal content, acid-generating potential, and contaminant levels.
- Traceability and documentation: RongXing will ensure all sourced materials are documented through material tracking systems to ensure traceability, regulatory compliance, and accountability throughout the supply chain.
- Integration with rehabilitation objectives: Where feasible, RongXing will ensure sourcing activities is aligned with mine closure and rehabilitation plans of partner sites, contributing to the stabilisation and progressive restoration of disturbed areas.

6.1.2 Negative Impacts

Soil Degradation and Acidification

Impact:

Project activities involving sulfuric acid storage, high-pressure acid curing, leaching operations, and solution transfer pipelines present a risk of soil contamination through accidental leaks, spills, or pipeline ruptures. Such incidents may lower soil pH, reduce soil fertility, and impair the ability of affected areas to support vegetation, thereby disrupting local ecological functions and land-use potential.

Mitigation Measures:

- Topsoil stripping and controlled storage: During construction, Rong Xing Investment Limited will strip and stockpile topsoil from disturbed areas in designated, fenced, and clearly demarcated locations. Stored topsoil will be protected from erosion and contamination and will be reused during site rehabilitation and closure activities to restore soil structure and fertility.
- Engineered containment and bunding: RongXing will install Bunded and lined containment systems beneath all sulfuric acid storage tanks, reagent handling areas, and process solution transfer points during construction. These systems will be inspected and maintained throughout operation to prevent acid migration into surrounding soils.
- Double-walled pipelines with leak detection: RongXing will ensure all major acid and slurry pipelines are constructed using double-walled or corrosion-resistant materials fitted with interstitial leak detection systems to allow early identification and rapid response to leaks.
- Use of neutralising agents: RongXing will store neutralising materials such as lime or soda ash on site and applied immediately following any acid spill or leakage to neutralise affected soils

and restore pH balance.

- Routine soil monitoring and remediation: RongXing will be conducting periodic soil sampling in high-risk areas to detect early signs of contamination. Where elevated acidity or metal concentrations are identified, appropriate remediation measures will be implemented in line with ZEMA-approved procedures.

Soil Erosion Induced by Construction Activities

Impact:

Construction activities associated with the acid curing facility on Plot 19, wet screening systems, conveyor corridors, thickener foundations, access roads, and utility installations may disturb exposed soils. Excavation, grading, and heavy vehicle movement could increase soil erosion, leading to loss of topsoil, sedimentation of drainage channels, and reduced soil stability, particularly during the rainy season.

Mitigation Measures:

- Progressive site clearance and rehabilitation: RongXing will implement phased clearing, limiting the extent of exposed soil at any given time and undertaking progressive backfilling and rehabilitation immediately after construction activities are completed.
- Topsoil management: Prior to earthworks, RongXing will ensure topsoil is stripped, stockpiled, and protected in designated areas for later reapplication during site rehabilitation and landscaping.
- Erosion and sediment control measures: During construction, RongXing will install silt fences, sediment traps, diversion channels, and temporary drainage controls to prevent runoff and sediment transport to surrounding areas.
- Stabilisation of disturbed surfaces: RongXing will exposed areas are compacted, gravelled, or temporarily vegetated as soon as practicable to reduce erosion risk, especially along access roads and conveyor alignments.
- Stormwater management: RongXing will implement a stormwater management plan to control runoff velocity and direction, directing flows to designed sedimentation and neutralisation structures.
- Inspection and maintenance: RongXing will conducting routine inspections, particularly after heavy rainfall events, and promptly repair any erosion control failures.
- Revegetation: Following construction, RongXing will ensure disturbed areas are revegetated

using native grasses and ground cover species to restore soil stability and reduce long-term erosion.

Acid Fume Release

Impact:

During pumping, filling, or transfer of sulfuric acid in the high-pressure acid curing system and SX–EW operations, there is a risk of acid mist or vapour emissions. Such emissions can negatively affect soil quality, vegetation, and air quality, and may pose health hazards to workers and nearby communities if uncontrolled.

Mitigation Measures:

- Vapor arrestors and pressure-relief systems: RongXing will ensure all sulfuric acid tanks and storage vessels are equipped with vapour arrestors, vent scrubbers, and pressure-relief systems to prevent uncontrolled release of acid fumes.
- Automated level monitoring: Tanks and transfer systems will use automated level sensors and alarms to prevent overfilling, spillage, and accidental emissions.
- Controlled handling by trained personnel: RongXing will ensure only authorised and trained personnel will handle acid transfers, following strict operational protocols, use of PPE, and emergency response procedures.
- Enclosed transfer lines and ventilation: RongXing will ensure acid transfer pipelines and curing feed points are enclosed or vented to localised fume extraction systems to minimise fugitive emissions.
- Routine monitoring and audits: RongXing will be conducting continuous monitoring of air quality at key points and periodic operational audits will ensure compliance with occupational exposure limits and early detection of abnormal vapour releases.

Surface Water Contamination

Impact:

Stormwater runoff from acid curing, leaching areas, chemical storage, and process yards can transport hazardous chemicals, including sulfuric acid and metal-laden solutions, into nearby water bodies such as streams or drainage channels. This could degrade surface water quality, affect aquatic ecosystems, and pose risks to downstream users.

Mitigation Measures:

- Impermeable bunds and containment pads: RongXing will ensure all chemical storage,

leaching, and process areas are constructed with HDPE-lined, impermeable bunds and concrete containment pads to prevent uncontrolled runoff.

- Stormwater treatment systems: RongXing will ensure all collected stormwater is directed through sedimentation ponds, neutralisation basins, and chemical interceptors before any controlled discharge, ensuring compliance with water quality standards.
- Roofed and fully contained handling areas: RongXing will ensure acid curing and reagent handling areas is fully roofed and contained to prevent interaction between rainfall and hazardous chemicals.
- Controlled waste storage and disposal: RongXing will store all hazardous wastes, including spent solutions and sludges, in bunded, lined facilities and disposed of in accordance with ZEMA-approved protocols.
- Monitoring and early response: RongXing will be conducting regular water quality monitoring upstream and downstream of the plant to detect any potential contamination early, with rapid containment and corrective actions implemented if needed.

Groundwater Contamination

Impact:

Subsurface leaks from acid storage tanks, pipelines, leach pads, or process solution handling systems may infiltrate soils and reach underlying aquifers. This could degrade groundwater quality, posing risks to domestic, agricultural, and ecological water users.

Mitigation Measures:

- Monitoring boreholes and piezometers: RongXing will install a network of monitoring wells upgradient and downgradient of the facility in addition to the existing to detect any leakage or chemical migration into groundwater.
- Secondary containment systems: RongXing will ensure all critical tanks, pipelines, and solution transfer points are equipped with bunded or double-walled containment to capture potential leaks before they reach the subsurface.
- Regular water sampling and analysis: RongXing will be conducting groundwater sampling periodically to monitor pH, metal concentrations, and other key parameters. Data will be reviewed for compliance with ZEMA water quality standards.
- Rapid response protocols: In the event of detected contamination, RongXing will ensure

immediate remediation measures including soil excavation, neutralisation, or containment are implemented to prevent further spread.

- Preventive maintenance and inspection: RongXing will regularly inspect and maintain pipelines, tanks, and pumps to minimise the likelihood of accidental leaks.

Fugitive Dust Emissions

Impact:

Handling, transfer, and storage of tailings, overburden, and crushed ore may generate airborne dust, which can degrade local air quality, affect vegetation, contribute to respiratory hazards for workers, and create nuisance impacts for surrounding communities.

Mitigation Measures:

- Dust suppression on conveyors and transfer points: RongXing will install mist sprayers, water sprays, and partial enclosures along all high-dust conveyors, hoppers, and transfer chutes to reduce airborne particulate emissions.
- Surface treatment of internal roads: RongXing will ensure All internal haul roads and operational traffic areas are gravelled or treated with dust-binding surface stabilizers to minimise dust from vehicle movement.
- Vegetative windbreaks and buffer zones: RongXing will plant native trees, shrubs, and grasses strategically around the processing plant, tailings storage, and stockpile areas to act as windbreaks, reducing offsite dust dispersion and providing ecological co-benefits.
- Monitoring and maintenance: RongXing will be conducting regular inspection and maintenance of suppression systems and roads to ensure effectiveness, and dust deposition or complaints from nearby communities will trigger corrective actions.
- Training and operational controls: RongXing will train workers on dust management protocols, including safe stockpile handling and minimising drop heights during ore transfer.

Habitat Fragmentation and Faunal Disturbance

Impact:

Construction and operational activities, including site clearing, access road upgrades, stockpile management, and new facility construction, may fragment habitats and disturb terrestrial fauna and bird species within the Chambishi Industrial Area. Disturbance may include loss of shelter, disruption of foraging patterns, and displacement of sensitive species.

Mitigation Measures:

- Pre-construction ecological surveys: RongXing will conduct detailed surveys to identify protected or sensitive species, nesting areas, and critical habitats prior to any clearing or earthworks.
- Timing of construction activities: RongXing will schedule activities to avoid peak breeding, nesting, or migratory seasons for local fauna and bird populations.
- Vegetation restoration and landscaping: RongXing will rehabilitate cleared areas post-construction using native grasses, shrubs, and tree species, restoring habitat connectivity and ecological function.
- Buffer zones and wildlife corridors: RongXing will maintain retention of natural vegetation along drainage lines, riparian strips, and site boundaries where feasible to support faunal movement and ecological connectivity.
- Monitoring and adaptive management: RongXing will conduct ecological monitoring to track fauna presence, nesting activity, and habitat recovery, with adaptive measures implemented if negative impacts are detected.

Loss of Vegetation and Topsoil

Impact:

Site preparation, including clearing for the acid curing building, wet screening, conveyor lines, and stockpile areas, may result in the removal of vegetation and topsoil, leading to soil degradation, erosion, reduced fertility, and temporary loss of habitat for local flora and fauna.

Mitigation Measures:

- Topsoil stripping and controlled storage: During construction, RongXing will ensure topsoil from disturbed areas is carefully stripped, labelled, and stockpiled in designated, fenced areas to prevent contamination and erosion. Stored topsoil will be reapplied during post-construction rehabilitation to restore soil fertility.
- Erosion and sediment control measures: RongXing will install silt fences, sediment traps, and temporary drainage channels around cleared areas to prevent soil erosion and sediment runoff into nearby drainage lines and water bodies.
- Revegetation with native species: RongXing will ensure cleared areas, including buffer zones and disturbed sites, are replanted with native grasses, shrubs, and trees to restore habitat, stabilise soils, and support biodiversity recovery.
- Progressive rehabilitation: Where feasible, RongXing will rehabilitate disturbed areas in

phases during construction to reduce the extent of bare soil exposure at any given time.

- Monitoring and maintenance: RongXing will ensure replanted areas are monitored for vegetation establishment, and supplementary planting or soil amendments will be applied as necessary to ensure successful rehabilitation.

Visual and Landscape Impact

Impact:

The construction of new acid curing buildings, wet screening systems, conveyors, and stockpiles may alter the existing rural and industrial landscape, affecting visual amenity for nearby communities and changing the character of the surrounding environment.

Mitigation Measures:

- Aesthetic design and maintenance: RongXing will ensure all buildings, process structures, and perimeter fencing are maintained to high aesthetic standards, including regular painting, cleaning, and repair to reduce visual deterioration.
- Screening with native vegetation: RongXing will plant native trees and shrubs strategically around the site, along perimeter fences, and near stockpiles to screen visible infrastructure from public view and soften the visual impact.
- Low-profile building designs and colour schemes: RongXing will ensure facility structures use earth-tone paint schemes and low-profile designs to blend with the surrounding environment and reduce visual intrusion.
- Minimisation of night-time glare: RongXing will install LED lighting with shielding and directional fixtures to minimise light pollution and glare affecting neighbouring communities and wildlife.
- Progressive landscaping: RongXing will ensure landscaping is implemented in phases during construction and early operation to quickly establish visual buffers and maintain the aesthetic character of the area.

Noise and Vibration Pollution

Impact:

Mechanical operations, including crushers, conveyors, acid curing mixers, electrowinning cells, and heavy vehicle movement, may generate high noise levels and vibrations, potentially exceeding occupational exposure limits and causing nuisance or health impacts to workers and nearby communities.

Mitigation Measures:

- Acoustic enclosures for noisy equipment: RongXing will ensure crushers, mixers, and other high-decibel machinery are housed in acoustic enclosures or sound-dampening structures to reduce noise emissions.
- Hearing protection for operators: RongXing will ensure workers operating or working near noisy machinery are provided with personal protective equipment (PPE) such as earmuffs or earplugs, and trained on proper use.
- Restriction of heavy equipment to daylight hours: RongXing will restrict use of heavy machinery and vehicle movements to daylight hours to minimise disturbance to local communities and reduce the impact on nocturnal wildlife.
- Regular maintenance of machinery: RongXing will maintain equipment to minimise mechanical vibration and noise from worn or misaligned components.
- Noise monitoring program: RongXing will be conducting periodic noise measurements at key locations within the plant and at nearby community boundaries to ensure compliance with ZEMA standards and occupational limits.

Hazardous and Solid Waste Generation

Impact:

The hydrometallurgical process, including acid curing, leaching, CCD washing, and solvent extraction electrowinning (SX-EW), generates hazardous wastes such as sludge, spent electrolytes, spent solvents, and other process residues. Improper handling could lead to soil and water contamination, occupational hazards, and environmental degradation.

Mitigation Measures:

- Waste inventory and tracking system: RongXing will implement a detailed waste-inventory system to record the generation, storage, and disposal of all hazardous and solid wastes.
- Segregation, storage, and disposal: RongXing will be segregating Waste streams by type, stored in bunded, ventilated, and labelled facilities, and disposed of in accordance with ZEMA-approved protocols and national environmental regulations.
- Dedicated hazardous waste facility: RongXing will establish a purpose-built, bunded, ventilated hazardous waste facility will be established for temporary storage prior to approved treatment, recycling, or offsite disposal.

- Neutralisation and recycling where feasible: RongXing will ensure spent solutions and sludge is neutralised, stabilised, or recycled within the process wherever technically feasible to reduce environmental burden.
- Monitoring and audits: RongXing will be conducting regular inspections, audits, and environmental monitoring to ensure compliance with ESMP requirements, waste management plans, and regulatory standards.

Electronic Waste (E-Waste)

Impact:

Obsolete or decommissioned electronic equipment, including control panels, PLCs, sensors, and auxiliary monitoring systems, may contain hazardous materials (e.g., heavy metals, batteries, and circuit components). Improper disposal could result in soil and water contamination, occupational exposure, and environmental hazards.

Mitigation Measures:

- Inventory and lifecycle tracking: RongXing will ensure all electronic systems are recorded in an asset and lifecycle inventory, tracking age, condition, and planned replacement schedules to anticipate e-waste generation.
- Refurbishment and scheduled upgrades: Where feasible, RongXing will refurbish or upgrad electronics and control systems instead of being discarded, minimising the generation of e-waste.
- ZEMA-compliant disposal: RongXing will ensure all decommissioned or obsolete electronics are disposed of according to ZEMA-approved procedures, including collection by licensed e-waste recyclers or return to manufacturers for safe handling.
- Staff training and awareness: RongXing will ensure personnel handling electronic equipment receive training on safe handling, storage, and segregation of e-waste to prevent accidental release of hazardous materials.
- Monitoring and documentation: RongXing will ensure disposal records and waste audits are maintained to ensure compliance with ESMP requirements and regulatory obligations.

Chemical Handling and Storage Hazards

Impact:

Handling and storage of sulfuric acid, solvents, flocculants, and other process chemicals pose risks

of chemical burns, respiratory exposure, fire, or accidental release, potentially affecting workers and the surrounding environment. Improper management could lead to soil and water contamination or occupational injuries.

Mitigation Measures:

- Acid-resistant and fail-safe storage tanks: RongXing will construct all chemical storage tanks from acid-resistant materials and fitted with automatic shutoff valves to prevent overfilling or accidental release.
- Continuous monitoring and alarms: RongXing will equip tanks and chemical handling systems with temperature, pressure, and leak sensors linked to alarms for immediate detection and response to abnormal conditions.
- Staff training and emergency preparedness: RongXing will ensure personnel receive comprehensive training on chemical safety, spill response, emergency procedures, and PPE use, with refresher courses conducted regularly.
- Third-party audits and inspections: RongXing will conduct independent audits periodically to verify compliance with ZEMA standards, ESMP requirements, and best practice chemical handling protocols.
- Containment and secondary measures: RongXing will install bund areas, lined sumps, and secondary containment systems around all chemical storage and handling zones to capture accidental leaks.

Electrolyte and Sludge Disposal

Impact:

Spent electrolytes and sludge from electrowinning (EW) units may contain toxic metals, including copper, nickel, or trace heavy metals. Improper handling or disposal could lead to soil and water contamination, environmental hazards, and occupational risks.

Mitigation Measures:

- Neutralisation and recycling of spent solutions: RongXing will neutralise all spent electrolytes and, where feasible, recycled back into the process to reduce waste volumes and minimise environmental impact.
- Safe storage and disposal of sludge: RongXing will collect sludge in leak-proof, bunded containers and sent to ZEMA-approved recyclers or disposal facilities in compliance with environmental regulations.

- Soil and environmental monitoring: RongXing will be conducting regular soil sampling and monitoring around EW units to detect any accumulation of metals. Remediation measures, such as soil excavation or stabilisation, will be implemented if contaminant levels exceed regulatory limits.
- Operational controls and training: RongXing will train EW operators on proper handling of electrolytes and sludge, including spill prevention, safe transfer, and emergency response procedures.

Power Supply Disruptions and Energy Demand

Impact:

Interruption of electricity supply from the national grid could halt critical processes, such as high-pressure acid curing, leaching, CCD washing, SX–EW operations, or pumping systems. Power outages may lead to chemical spills, process inefficiencies, equipment stress, and safety risks. Additionally, the project's high energy demand could place additional load on local electricity infrastructure.

Mitigation Measures:

- Backup power systems: RongXing will install diesel generators during the construction phase to ensure uninterrupted power supply during grid outages. Generators will be tested monthly, during operations to ensure reliability.
- Energy-efficient equipment: All motors and pumps will be IE3-rated and paired with variable-frequency drives (VFDs) to optimise energy consumption and reduce operational strain on the grid.
- Load management and operational scheduling: RongXing will schedule high-demand processes in coordination with grid availability to minimise peak load impacts and prevent unplanned outages.
- Monitoring and maintenance: RongXing will undertake continuous monitoring of energy consumption, with preventive maintenance of generators, transformers, and critical electrical systems to ensure uninterrupted operation.

Corrosion of Infrastructure

Impact:

Acid vapours and process chemicals generated during acid curing, leaching, and SX–EW

operations can degrade metallic structures, walkways, support beams, and equipment foundations, potentially causing structural damage, safety hazards, and operational downtime.

Mitigation Measures:

- Use of corrosion-resistant materials: RongXing will construct all walkways, platforms, structural supports, and exposed pipework from acid-resistant materials, such as stainless steel, coated metals, or reinforced concrete with protective liners.
- Routine inspections and preventive maintenance: RongXing will implement regular inspection schedules to identify early signs of corrosion or wear. Preventive maintenance and timely replacement of vulnerable components will be conducted to prevent structural failures.
- Drainage and neutralization systems: RongXing will ensure all runoff from acid-handling areas is directed through engineered drainage channels to neutralization sumps, preventing chemical contact with foundations, supports, or surrounding soil.
- Operator awareness and monitoring: RongXing will train site personnel to identify corrosion risks, report defects promptly, and follow safe maintenance procedures during operations.
- Protective coatings and barriers: Where applicable, RongXing will apply anti-corrosive coatings and barriers to exposed surfaces to further reduce deterioration from acid exposure.

Risk to Aquatic Ecosystems (Luela Stream)

Impact:

Runoff from the acid curing building, wet screening areas, stockpiles, and process water discharge may carry acidic solutions, suspended solids, or trace metals into the Luela Stream, potentially impacting aquatic flora, fish, and invertebrate populations, and altering water quality downstream.

Mitigation Measures:

- Perimeter drainage and interceptors: RongXing will install engineered drainage channels equipped with oil and chemical interceptors around all acid-handling, leaching, and stockpile areas to capture runoff before it reaches the stream.
- Water quality monitoring: RongXing will continue monitoring upstream and downstream to regularly measure pH, turbidity, heavy metals, and other relevant parameters, ensuring early detection of potential contamination.
- Emergency spill containment: In the event of accidental chemical or slurry spills, RongXing will carry out rapid response protocols, and deploy containment booms and neutralization kits immediately.

- Sediment and erosion control: RongXing will implement silt fences, sediment traps, and vegetative buffers along disturbed areas to reduce sediment transport into the stream.

Pipeline Leakage or Burst

Impact:

Failure or rupture of pipelines transporting acidic slurry, process water, or leach solutions could lead to soil acidification, surface and groundwater contamination, and health risks for workers and nearby communities..

Mitigation Measures:

- Dual pipelines with auto-switch valves: RongXing will install critical slurry and process lines in dual configurations with auto-switch valves to allow rapid rerouting and minimize the volume released in case of a failure.
- Corrosion-resistant materials: RongXing will construct Pipelines from HDPE or acid-resistant steel to withstand chemical corrosion and reduce the risk of leaks or bursts.
- Flow and pressure monitoring with automatic shutdown: RongXing will use flow meters and pressure sensors to continuously monitor pipeline integrity and trigger automatic shutdown if abnormal conditions are detected.
- Containment trenches and bunds: RongXing will install engineered containment trenches, sumps, and bunds along pipeline routes to capture any leaked slurry before it reaches the environment.
- Emergency preparedness drills: RongXing will be conducting quarterly emergency response drills with staff to ensure rapid containment, safe clean-up, and effective communication in case of pipeline incidents.
- Regular inspection and maintenance: RongXing will ensure pipelines routine inspections, pressure testing, and maintenance to detect wear, corrosion, or weaknesses before failures occur.

Fire and Explosion Risks

Impact:

Structural The use of flammable organic solvents in the Solvent Extraction (SX) circuit presents a risk of fire or explosion, which could cause injuries to workers, damage to equipment, and environmental contamination if not properly managed.

Mitigation Measures:

- ATEX-compliant fittings and hazardous zones: RongXing will design and equip all SX areas with ATEX-certified piping, valves, and electrical fittings, and clearly marked as designated hazardous zones to prevent ignition sources.
- Fire suppression systems: RongXing will install appropriate fire suppression systems, including foam, CO_2, and dry chemical extinguishers, at strategic points within SX zones, EW areas, and solvent storage facilities.
- Quarterly fire drills and coordination with authorities: RongXing will be conducting fire drills quarterly with local fire services and internal staff to ensure rapid and effective emergency response.
- Operator training: RongXing will train staff in flammable liquid handling, emergency response, and evacuation procedures, including proper use of PPE and firefighting equipment.
- Ventilation and solvent handling controls: RongXing will ensure SX areas include adequate ventilation systems, fume extraction, and spill containment measures to minimise vapor accumulation and reduce explosion risk.
- Regular inspection and maintenance: RongXing will be conducting routine inspections of piping, storage tanks, ventilation systems, and fire suppression equipment to ensure functionality and regulatory compliance.

6.2 Socio-economic and Cultural

6.2.1 Positive Impacts and Enhancement Measures

Employment Creation

Impact:

The project will generate direct and indirect employment across all phases, including civil works, equipment installation, operational staffing, transport operations, safety oversight, and eventual decommissioning activities such as dismantling and site restoration. These opportunities will stimulate local livelihoods and enhance technical capacity within the host communities. RongXing is committed to ensuring that job creation extends beyond basic labour roles to include skilled positions in ore screening, pump operation, metallurgical plant operations, environmental monitoring, and acid-handling processes.

Enhancement Measures

- Local Employment Policy: RongXing will develop and enforce a Local Employment Policy that prioritises residents from nearby communities for general labour, semi-skilled, and skilled positions across all project phases.
- Technical skills development: RongXing will provide targeted training in ore screening, pump operation, sulfuric acid handling, plant process control, and environmental monitoring to ensure long-term employability and career growth.
- Partnerships with vocational institutions: RongXing will collaborate with TEVET colleges, vocational schools, and training centres to establish apprenticeships and practical plant-based training programs for youths, women, and recent graduates.
- Equitable recruitment monitoring: RongXing will maintain records of employment by gender, age, and skill level to ensure transparency and equitable opportunity distribution.
- Community engagement: RongXing will conduct regular awareness campaigns and recruitment drives within host communities to inform residents of available opportunities and skill requirements.

Local Business Growth

Impact:

The project will stimulate demand for goods and services such as construction materials, catering, transportation, mechanical maintenance, and waste management, thereby encouraging the growth of local small-to-medium enterprises (SMEs) and boosting the local economy. Increased participation of local businesses will also strengthen community relations and project acceptance.

Enhancement Measures

- Prioritized local procurement: RongXing will procure goods and services from local SMEs, particularly suppliers of construction materials, PPE, food services, metal fabrication, mechanical services, and transport.
- Long-term service contracts: RongXing will offer extended contracts to qualified local suppliers to support business stability, capacity development, and skills transfer.

- Supplier capacity-building workshops: RongXing will Organize regular workshops to enhance financial management, quality control, occupational health & safety compliance, and overall operational efficiency among local suppliers.
- Monitoring and reporting: RongXing will maintain records of local procurement, contract awards, and SME participation to ensure transparency and continuous improvement in local business engagement.

Infrastructure Development

Impact:

The project will involve upgrading access roads and installing water boreholes to support construction and operational activities. These infrastructure improvements will indirectly benefit surrounding communities by improving road accessibility, reducing vehicle-related dust and accidents, and enhancing access to reliable water resources where feasible.

Enhancement Measures

- Shared road use and maintenance: RongXing will upgrade and maintain access roads that are used by both project vehicles and community traffic, ensuring safer travel and reduced wear through routine grading and drainage maintenance.
- Controlled community access to water: Where technically and legally feasible, RongXing will allow controlled community access to project borehole water, subject to water availability, quality standards, and agreed management arrangements.
- Infrastructure management coordination: RongXing will engage with local authorities and community leadership to coordinate infrastructure use, maintenance responsibilities, and safety measures
- Road safety measures: RongXing will install signage, speed controls, and road markings along shared access routes to improve safety for pedestrians, cyclists, and motorists.

Skills and Technology Transfer

Impact:

The operation of modern hydrometallurgical systems, including high-pressure acid curing, CCD thickeners, SX–EW circuits, PLC-controlled dosing systems, and automated monitoring platforms, will introduce advanced technical competencies to the local workforce. This will enhance human capital development, national technical capacity, and long-term technological advancement within Zambia's mining and mineral processing sector.

Enhancement Measures

- Internship and industrial attachment programmes: RongXing will partner with local universities, colleges, and TEVET institutions to host students during construction and operation phases, placing interns within operations, maintenance, electrical, instrumentation, metallurgy, and environmental monitoring units.
- Structured on-the-job training: RongXing will implement mentorship and job-rotation programmes that allow employees to gain hands-on experience across key plant areas, including leaching, SX–EW, process control, and laboratory operations.
- Professional certifications: RongXing will enrol selected staff in recognised certification programmes (e.g., plant operations, welding, electrical safety, chemical handling, and occupational health & safety) prior to commissioning and throughout operation
- Refresher and upskilling courses: RongXing will provide periodic refresher training and technology updates to ensure continuous improvement, compliance with evolving standards, and sustained operational excellence.
- Knowledge retention: RongXing will maintain training records and competency matrices to track skills transfer and ensure institutional knowledge is retained locally over the project life.

Tax and Royalty Revenue

Impact:

The project will contribute significantly to national and local government revenues through the payment of corporate income tax, Value Added Tax (VAT), Pay As You Earn (PAYE), mineral

royalties, and other statutory levies associated with copper production. These revenues will support the provision of public services, infrastructure development, and social programmes, thereby contributing to broader economic development at local, regional, and national levels.

Enhancement Measures

- Transparent fiscal reporting: RongXing will maintain full transparency in all tax declarations, financial audits, and statutory submissions in line with Zambian legal and regulatory requirements.
- Regulatory compliance: RongXing will ensure strict compliance with Zambia Revenue Authority (ZRA) reporting requirements and the timely payment of all taxes, royalties, and statutory contributions throughout the project life cycle.
- Collaboration with local authorities: RongXing will engage local councils and relevant government agencies in Corporate Social Responsibility (CSR) and community development planning to ensure that project-related fiscal contributions align with identified local development priorities.
- Governance and accountability: RongXing will maintain clear financial records and internal controls to support audits and reinforce accountability in revenue generation and contribution to the national economy.

Improved Community Livelihoods

Impact:

Increased employment opportunities and higher household incomes arising from the project will stimulate demand for goods and services, encouraging the establishment and expansion of local enterprises such as retail shops, transport services, catering businesses, and artisanal trades. These economic linkages will improve living standards, strengthen household resilience, and promote entrepreneurship within surrounding communities.

Enhancement Measures

- Local procurement policy: From the commencement of construction, RongXing will implement a local procurement policy that prioritises sourcing of plant-related consumables and services from nearby suppliers, with annual monitoring and reporting on local procurement

performance throughout operation.

- Enterprise development support: RongXing will encourage local entrepreneurship by offering business training, mentorship, and market linkages during construction and operation, including periodic workshops on business planning, financial management, and compliance requirements.
- Inclusive participation: RongXing will ensure that women, youths, and vulnerable groups are actively targeted in livelihood and enterprise support programmes to promote equitable benefit sharing.
- Monitoring and feedback: RongXing will track livelihood outcomes through community consultations and socio-economic monitoring, adjusting support mechanisms in response to community needs and feedback.

6.2.2 Negative Socio-Economic Impacts and Mitigation Measures

Occupational Health and Safety Risks

Impact:

Project activities involving the handling of concentrated sulfuric acid, ore screening and transfer, and operation of heavy mechanical equipment present significant occupational health hazards. Potential risks include chemical burns, inhalation of acidic fumes and dust, respiratory irritation, noise-induced hearing loss, vibration-related injuries, and musculoskeletal disorders if not properly managed.

Mitigation Measures:

- Provision of appropriate PPE: RongXing will supply all workers with task-specific personal protective equipment, including acid-resistant suits, gloves, face shields, goggles, respirators, and hearing protection, with routine inspection and replacement schedules.
- Engineering controls: RongXing will install enclosed processing units, local exhaust ventilation, and acid fume extraction systems in high-risk areas to minimise worker exposure.
- Medical surveillance: RongXing will implement a routine occupational health monitoring programme, including pre-employment, periodic, and exit medical examinations, to detect early signs of occupational illness.
- Training and competency: RongXing will provide mandatory training on chemical handling,

hazard communication, safe work procedures, and emergency response, with regular refresher courses.

- Monitoring and reporting: RongXing will conduct workplace exposure monitoring (dust, noise, fumes, vibration) and maintain records of incidents, near misses, and corrective actions.
- Emergency preparedness: RongXing will establish on-site emergency showers, eyewash stations, first-aid facilities, and clearly defined incident response procedures.

Public Health Concerns (Respiratory, Waterborne, and Vector-Borne Diseases)

Impact:

Project activities may result in dust emissions, potential contamination of surface and groundwater, and the formation of stagnant water in decant, containment, or stormwater management ponds. These conditions could increase the risk of respiratory illnesses, waterborne diseases (such as cholera and dysentery), and vector-borne diseases, including malaria, affecting both project workers and surrounding communities if not adequately controlled.

Mitigation Measures:

- Vector control and drainage management: RongXing will implement a vector control programme that includes regular treatment of decant, sedimentation, and retention ponds with environmentally approved larvicides, combined with routine drainage maintenance to prevent stagnant water accumulation throughout construction and operation.
- Dust and hygiene control: RongXing will apply dust suppression measures (water spraying, enclosures, and road maintenance) and enforce site hygiene standards, including adequate sanitation facilities and waste management systems, to reduce disease transmission risks.
- Health awareness and prevention programmes: RongXing will collaborate with local health authorities and clinics to conduct health education campaigns, including awareness on respiratory health, water hygiene, and vector-borne disease prevention. Where feasible, support distribution of mosquito nets and protective materials to workers and nearby communities.
- Water quality surveillance: RongXing will establish a water quality monitoring programme for project boreholes and nearby surface water bodies, with regular sampling and analysis. In the event of contamination, provide alternative safe water supplies and promptly notify relevant authorities and affected communities.
- Medical support and reporting: RongXing will maintain on-site medical services, health

reporting systems, and referral arrangements with nearby health facilities to ensure timely response to any disease outbreaks.

Community Safety Risks from Transport

Impact:

The transportation of sulfuric acid, ore, tailings, fuel, and other project materials using heavy-duty vehicles may increase the risk of traffic accidents, chemical spills, and pedestrian injuries along access roads. These risks could affect nearby communities, road users, and sensitive facilities if not adequately managed.

Mitigation Measures:

- Designated transport routes: RongXing will establish and enforce approved haulage routes that minimise interaction with residential areas, schools, markets, and community facilities, in consultation with local authorities.
- Vehicle safety controls: RongXing will equip all acid tankers and heavy vehicles with GPS tracking systems, emergency spill containment kits, fire extinguishers, and standardised hazard signage.
- Speed and traffic management: RongXing will implement speed control measures, including speed governors, speed bumps, reflective signage, and clearly marked pedestrian crossings along internal and shared access roads.
- Driver training and competency: RongXing will ensure all drivers receive specialised training in hazardous materials transport, defensive driving, and emergency response, with periodic refresher courses.
- Emergency preparedness: RongXing will coordinate with local emergency services and maintain incident response procedures for traffic accidents and chemical spill events, including community notification protocols.
- Monitoring and compliance: RongXing will conduct routine inspections and audits of vehicle condition, driver compliance, and transport operations to ensure adherence to traffic and safety regulations.

Increased Risk of Communicable Diseases Including STIs and HIV/AIDS

Impact:

The influx and movement of workers during construction and operation may increase the risk of

transmission of HIV/AIDS and other sexually transmitted infections (STIs) within the workforce and surrounding communities. Without appropriate controls, this could place additional pressure on local health services and affect community well-being.

Mitigation Measures:

- HIV/AIDS and STI prevention programme: RongXing will implement a comprehensive prevention and awareness programme that includes on-site counselling, voluntary testing services, and the distribution of protective measures to workers throughout the project life cycle.
- Awareness and education campaigns: RongXing will conduct regular community and workforce awareness workshops in collaboration with local health authorities, NGOs, and community leaders, focusing on prevention, stigma reduction, and access to treatment.
- Workplace policies: RongXing will enforce non-discrimination and confidentiality policies to protect affected individuals and encourage voluntary participation in testing and counselling programmes.
- Monitoring and reporting: RongXing will track programme participation and outcomes, while respecting confidentiality, to assess effectiveness and improve interventions over time.

Resettlement and Land Acquisition

Impact:

Temporary or permanent land acquisition and changes in land use associated with project infrastructure, access roads, and ancillary facilities may affect households, livelihoods, land access, and social cohesion. If not properly managed, such impacts could result in economic displacement, loss of assets, and community grievances.

Mitigation Measures:

- Resettlement Action Plan (RAP): RongXing will prepare and implement a Resettlement Action Plan in compliance with IFC Performance Standard 5, the Zambian Lands Act, and other applicable national legislation.
- Fair and timely compensation: RongXing will ensure that compensation packages reflect full replacement cost for land, structures, crops, and other assets, and include livelihood restoration measures for economically displaced persons.
- Stakeholder engagement: RongXing will conduct transparent, inclusive, and culturally appropriate consultations with all Project-Affected Persons (PAPs) throughout the planning

and implementation of resettlement activities.

- Livelihood restoration: RongXing will implement livelihood restoration programmes such as skills training, employment prioritisation, and enterprise support to restore and improve living standards of affected households
- Grievance Redress Mechanism (GRM): RongXing will establish and maintain a formal GRM to address resettlement-related complaints in a timely, fair, and accessible manner.
- Monitoring and reporting: RongXing will undertake independent monitoring and periodic audits of RAP implementation to ensure compliance and effectiveness.

Land Use Conflicts

Impact:

Project development may affect informal or unrecorded land users, including grazers, small-scale farmers, and artisanal miners, who may rely on the project area or surrounding land for livelihoods or access to natural resources. If not properly identified and managed, such impacts could result in land use conflicts, loss of access, and community grievances.

Mitigation Measures:

- Land tenure verification: RongXing will conduct cadastral checks, participatory land-use mapping, walkover surveys, and community consultations prior to construction to identify both formal and informal land users.
- Stakeholder engagement: RongXing will engage affected land users early in the project planning process to clarify land access arrangements, avoid sensitive areas, and agree on mitigation or compensation measures where applicable.
- Grievance Redress Mechanism (GRM): RongXing will establish and implement a formal, accessible, and transparent GRM to address land-related disputes and complaints in a timely manner.
- Conflict prevention and monitoring: RongXing will monitor land use dynamics throughout construction and operation and adjust management measures to prevent escalation of conflicts.
- Coordination with authorities: RongXing will work with local authorities and traditional leadership to ensure alignment with land administration processes and conflict resolution mechanisms.

Economic Displacement without Resettlement

Impact:

Even in cases where physical relocation does not occur, project activities may result in the loss of access to farmland, grazing areas, or other critical livelihood resources. This can reduce household incomes, increase economic vulnerability, and exacerbate poverty among affected local farmers, herders, and informal land users.

Mitigation Measures:

- Identification of Economically Displaced Persons (EDPs): RongXing will conduct a livelihood and resource access survey prior to construction to identify all persons experiencing economic displacement, including those not physically relocated. During operation, ensure these EDPs are included in livelihood restoration and compensation programmes.
- Livelihood Restoration Assistance: RongXing will provide support equivalent to physical resettlement measures, including alternative land access, employment opportunities, or cash/in-kind compensation to restore lost income streams.
- Skills Development and Vocational Training: RongXing will develop and deliver vocational training programs relevant to the local economy (e.g., poultry farming, agro-processing, carpentry, mechanics). Training should commence before major construction activities and continue throughout operation with follow-up mentorship and advanced skills modules.
- Monitoring and Evaluation: RongXing will track the effectiveness of livelihood restoration measures and adapt interventions to ensure sustainable income recovery and economic resilience for all affected persons.
- Stakeholder Engagement: RongXing will maintain continuous consultation with EDPs to ensure concerns are addressed and mitigation measures are responsive to community needs.

Land Use Change and Resource Access

Impact:

Permanent infrastructure, including plant buildings, conveyor systems, and associated facilities, may result in the loss of agricultural land, grazing areas, and forested resources, restricting community access to natural resources and traditional livelihoods.

Mitigation Measures:

- Participatory Land-Use Mapping: RongXing will conduct consultative mapping exercises with local communities prior to construction to identify critical agricultural, grazing, and forest

resource areas.

- Optimised Facility Layouts: RongXing will adjust plant and infrastructure designs to maintain access to essential grazing corridors, water points, and communal resource areas, where feasible.
- Alternative Livelihood Programs: RongXing will develop and implement compensatory livelihood initiatives, such as agroforestry plots, fishponds, beekeeping, and small-scale horticulture, to restore or enhance community income sources affected by land use changes.
- Community Engagement and Monitoring: RongXing will engage affected stakeholders in the planning, implementation, and monitoring of alternative livelihood programs to ensure sustainability and effectiveness.
- Periodic Review: RongXing will evaluate the success of mitigation measures annually and make adaptive changes to ensure ongoing access to resources and livelihood support.

Transport Hazards

Impact:

The movement of ore, sulfuric acid, fuels, and other hazardous materials via heavy-duty vehicles increases the risk of traffic accidents, spills, and injuries to workers and nearby communities.

Mitigation Measures:

- Traffic Management Plan (TMP): RongXing will develop and implement a comprehensive TMP covering all construction and operational vehicle movements, including designated routes, loading/unloading procedures, and delivery schedules to minimise interaction with residential areas and sensitive community facilities.
- Vehicle Monitoring and Control: RongXing will equip all transport vehicles with GPS tracking systems, speed governors, and emergency communication devices to ensure compliance with operational and safety protocols.
- Random Inspections and Compliance Audits: RongXing will conduct periodic inspections of vehicles, drivers, and transport procedures to verify adherence to safety standards and TMP requirements.
- Driver Training: RongXing will provide specialised training in hazardous material handling, defensive driving, and emergency response procedures for all drivers before and during operations.
- Emergency Response Preparedness: RongXing will maintain spill containment kits, first aid resources, and clear emergency response protocols at key transport points along access roads and

plant interfaces.

- Community Awareness: RongXing will engage local communities with information on designated transport routes, expected traffic schedules, and safety precautions to reduce exposure risks.

Gender and Vulnerable Group Exclusion

Impact:

Project employment opportunities may disproportionately benefit men or already skilled workers, leading to the exclusion of women, marginalized youth, and other vulnerable groups from technical, supervisory, and long-term employment roles. This may reinforce existing socio-economic inequalities within surrounding communities.

Mitigation Measures:

- Affirmative Employment Policy: RongXing will develop and implement a Gender and Social Inclusion Policy that sets clear targets for participation of women, youth, and vulnerable groups across construction, operation, and management levels, including technical and supervisory roles.
- Inclusive Recruitment Practices: RongXing will ensure recruitment processes are transparent, locally advertised, and free from discrimination, with selection criteria that recognise transferable skills and potential rather than formal qualifications alone.
- Supportive Workplace Arrangements: RongXing will provide on-site childcare facilities, flexible work schedules, and appropriate maternity and family-friendly policies to remove barriers to participation for women and caregivers.
- Targeted Skills Development: RongXing will partner with local NGOs, vocational training institutions, and women's organisations to deliver tailored technical training, apprenticeships, and mentorship programmes for women and marginalized youth in areas such as plant operations, environmental monitoring, safety, and equipment maintenance.
- Safe and Respectful Work Environment: RongXing will enforce a zero-tolerance policy on sexual harassment and discrimination, supported by confidential reporting mechanisms and regular gender-sensitivity training for all staff and contractors.
- Monitoring and Reporting: RongXing will track and report gender-disaggregated employment data annually to assess progress and adjust inclusion strategies as needed.

Inequitable Benefit Distribution

Impact:

Perceived or actual unequal distribution of project benefits including employment opportunities,

procurement contracts, training programmes, and community investments may lead to social tension, grievances, and reduced project acceptance among surrounding communities and vulnerable groups.

Mitigation Measures:

- Social Impact Assessment (SIA): RongXing will conduct a comprehensive Social Impact Assessment prior to construction to identify all stakeholder groups, including women, youth, traditional leaders, informal land users, and vulnerable households, ensuring equitable representation and participation in decision-making processes.
- Local Stakeholder Liaison Committee: RongXing will RongXing will establish a multi-stakeholder liaison committee comprising community representatives, local authorities, women and youth groups, and project management. The committee will meet quarterly to review employment statistics, local procurement performance, CSR implementation, and grievance trends.
- Transparent Benefit Allocation: RongXing will publicly disclose local employment criteria, procurement procedures, and community development commitments, including eligibility requirements and selection processes, to reduce perceptions of favouritism.
- Gender and Social Inclusion Monitoring: RongXing will integrate gender-disaggregated and vulnerability-focused indicators into project monitoring systems. Findings will be reviewed semi-annually and used to adjust recruitment, procurement, and community investment strategies based on feedback and observed gaps.
- Grievance Redress Mechanism (GRM): RongXing will maintain an accessible and culturally appropriate GRM that allows community members to raise concerns regarding benefit distribution, with clearly defined timelines for response and resolution.
- Feedback and Adaptive Management: RongXing will conduct annual community satisfaction surveys and stakeholder feedback sessions, using results to refine benefit-sharing approaches and improve social cohesion.

Power Supply Disruptions

Impact:

Interruptions to grid power supply may disrupt high-pressure acid curing, leaching, solvent extraction, and electrowinning operations, potentially resulting in process instability, chemical overflows, equipment damage, or uncontrolled releases if systems shut down abruptly.

Mitigation Measures:

- Backup power systems: During construction, RongXing will install diesel generator sets sized to

support all critical process units, including curing drums, pumps, thickeners, SX mixers, and EW cells. During operation, these systems will be maintained in a state of readiness, with monthly load testing and preventive maintenance.

- Hybrid energy solutions: RongXing will integrate hybrid solar-diesel power systems to supplement grid electricity, reduce dependence on fossil fuels, and ensure continuity of essential control and safety systems during outages.
- Energy-efficient equipment: Prior to commissioning, RongXing will procure and install energy-efficient motors and variable frequency drives (VFDs) to stabilize power demand, reduce start-up surges, and minimize stress on electrical infrastructure.
- Process automation and safe shutdown: RongXing will install Programmable logic controllers (PLCs) and uninterruptible power supplies (UPS) for critical control systems to enable controlled shutdown or safe holding modes during power interruptions, preventing spills or equipment failure.
- Grid coordination: During operation, RongXing will coordinate with ZESCO's load-management programmes, scheduling high-energy-demand activities during off-peak periods where feasible to improve grid reliability and reduce outage risks.

Inflation of Local Goods and Housing

Impact:

The influx of construction and operational personnel may increase demand for food, basic goods, and rental accommodation within surrounding communities, potentially leading to price inflation, reduced affordability for local residents, and pressure on limited housing stock.

Mitigation Measures:

- On-site and managed accommodation: During construction, RongXing will assess workforce accommodation requirements and, where feasible, establish temporary on-site accommodation or contractor-managed housing to reduce demand on community rental properties. During operation, housing allowances will be structured to avoid excessive distortion of local rental markets.
- Local food supply integration: RongXing will prioritise procurement of food and consumables from local farmers, traders, and cooperatives, supporting local production capacity and helping stabilise prices through predictable demand.
- Phased workforce mobilisation: RongXing will ensure workforce recruitment and mobilisation is phased in line with construction and commissioning schedules, preventing sudden population

influxes that could sharply drive up local prices.

- Market monitoring: During construction and operation, RongXing will engage local authorities and community leaders to periodically monitor prices of essential goods and housing, enabling early identification of inflationary trends and adaptive mitigation where necessary.

Occupational Fatigue and Process Errors

Impact:

Extended working hours, continuous monitoring of high-risk processes such as acid curing, wet screening, leaching, SX–EW operations, and slurry transfer, and exposure to repetitive or high-concentration tasks may result in worker fatigue, increasing the likelihood of human error, process upsets, chemical spills, and occupational accidents.

Mitigation Measures:

- Controlled shift scheduling: During construction and operation, RongXing will implement structured shift rotations, limiting routine exposure to 8–10 hours per shift, with mandatory rest breaks in compliance with Zambian labour regulations.
- Process automation and control systems: RongXing will install and maintain PLC- and SCADA-based control systems for acid dosing, curing parameters, slurry flow, and SX–EW operations to reduce reliance on manual intervention and minimise fatigue-related errors.
- Fatigue management procedures: RongXing will ensure supervisors apply a Fatigue Risk Management System (FRMS), including task rotation, monitoring of overtime, and restrictions on consecutive night shifts, particularly for control room and acid-handling personnel.
- Daily safety walkabouts: RongXing will ensure line supervisors and safety officers conduct daily safety and fatigue-awareness inspections, identifying early signs of fatigue, procedural deviations, or unsafe behaviour and implementing corrective actions immediately.
- Rest and welfare facilities: RongXing will ensure adequate rest areas, shaded break zones, hydration stations, and sanitation facilities are provided across operational areas, with particular emphasis on high-temperature and chemically intensive work zones.
- Training and awareness: RongXing will ensure workers receive regular training on fatigue recognition, human-factor risks, and safe work pacing, integrated into toolbox talks and refresher safety programmes.

Security and Vandalism

Impact:

The presence of valuable materials and infrastructure, including copper cathodes, sulfuric acid, organic solvents, electrical equipment, and fuel storage, may attract theft, trespassing, or vandalism. Security

incidents could pose safety risks to workers and surrounding communities, disrupt operations, and damage critical infrastructure.

Mitigation Measures:

- Physical security infrastructure: During construction and operation, RongXing will install and maintain perimeter fencing, controlled entry and exit points, security lighting, and CCTV surveillance covering processing areas, storage facilities, and access roads.
- Access control systems: RongXing will ensure all personnel and visitors are subject to badge-controlled access, visitor registration, and restricted entry to high-risk zones such as SX-EW areas, acid storage facilities, and power installations.
- Trained security personnel: RongXing will engage licensed and trained security staff to conduct regular patrols on a 24-hour basis. Security operations will follow community-friendly and human-rights-compliant protocols, consistent with the Voluntary Principles on Security and Human Rights.
- Coordination with local authorities: RongXing will maintain regular liaison with local police and community leadership, including the Sabina Police checkpoint, to enhance rapid response and information sharing.
- Incident reporting and investigation: RongXing will ensure all security-related incidents, including attempted theft or vandalism, are recorded, investigated, and managed through the Grievance Redress Mechanism (GRM), with corrective actions implemented to prevent recurrence.
- Community awareness: RongXing will conduct security awareness sessions with employees and nearby communities to discourage trespassing and promote shared responsibility for site safety.

Loss of Access to Land and Natural Resources

Impact:

The permanent footprint of new and upgraded project infrastructure, including the acid curing complex on Plot 19, wet screening systems, conveyor corridors, thickeners, and auxiliary facilities, may result in restricted access to agricultural land, grazing areas, and natural resource use for surrounding communities. This could affect subsistence farming, livestock movement, and collection of natural materials, potentially leading to livelihood disruption if not adequately managed.

Mitigation Measures:

- Participatory land-use planning: Prior to construction, RongXing will undertake participatory land-use mapping and community consultations to identify existing land uses, access routes, and resource dependence, ensuring that project layouts minimise unnecessary land take.

- Optimised brownfield design: RongXing will ensure facility siting prioritise existing industrial and disturbed areas within the Chambishi Industrial Area, limiting encroachment into active agricultural or grazing zones wherever feasible.
- Access corridor maintenance: Where safe and practicable, RongXing will maintain or re-route access corridors for livestock movement and community resource access around the plant perimeter.
- Compensation and livelihood restoration: RongXing will ensure affected land users are identified through socio-economic surveys and provided with fair compensation and livelihood restoration measures in accordance with Zambian law and IFC Performance Standard 5.
- Alternative livelihood support: RongXing will support alternative income-generating activities, such as agroforestry, small-scale livestock improvement, beekeeping, or skills training, to offset losses linked to restricted land access.

Grievance Redress Mechanism: RongXing will ensure a transparent and accessible GRM is operational throughout construction and operation to address complaints related to land access and resource use promptly and fairly.

6.3 Methodology of Impact Assessment

The identification of potential impacts associated with activities arising from the proposed project is very important for the mitigation of the adverse impacts and enhancement of positive impacts.

There are several methods of potential impact identification and evaluation. Some of the methods that have been used to identify and evaluate environmental impacts include but not limited to Ad Hoc, overlays, checklists, matrices, networks and computer aided.

Expert opinion and review by Specialists which includes all stakeholders is vital in the process of potential impacts identification and evaluation. The experts will normally utilize acquired knowledge, skills and experience and the stakeholders will review the impacts using local experiences, international standards and or guidelines.

This EIA study utilised a combination of checklists and matrices to identify and evaluate potential environmental impacts likely to arise from the proposed project.

6.4 Criteria for Impacts Identification and Evaluation

Significant direct and indirect environmental impacts were identified and evaluated considering their nature, spatial extent, duration, frequency, magnitude, severity and sensitivity.

6.4.1 Nature of Impacts

The nature of impacts is the type of effect that proposed activities have on the environment. These include the specific activities being performed, what is being affected and how it is being affected.

Broadly, impacts can be categorized as positive and negative impacts. The question whether the impact is direct or indirect could also define its nature. Is the impact residual? Is the impact cumulative (only applicable to negative impacts) and is the effect of the impact reversible? (only applicable to negative impacts).

6.4.2 Direct Impacts

These are impacts that appear immediately as a result of activities associated with the project. Direct impacts would be experienced mainly during the construction and operational phases of the proposed project. These include effects on the physical environment, health and safety of

the local people where the proposed activities are being implemented. Direct impacts could be positive or negative. Positive impacts are those that affect the physical environment, health and safety of the people in a positive manner. On the other hand, negative impacts are those which negatively or adversely affect the environment and the people within and in the vicinity of the proposed project area.

6.4.3 Indirect Impacts

These are impacts that are related to the proposed project but that arise from project activities at a secondary level. Indirect impacts are primarily socio-economic and extend beyond the project implementation. Indirect impacts include changes in economic activities and long-term changes, such as increased land degradation due to increased settlement and development in the area. Unlike direct impacts which occur in the immediate environment, indirect impacts would be felt in the adjacent regions. As with direct impacts, indirect impacts could also be both positive and negative.

6.4.4 Spatial extent

The geographical distribution or how far an impact might spread is indicated by spatial extent or distribution. Under spatial distribution, the impact could be site specific, local (a few kilometers away from proposed project site), and regional (within tens of kilometers from proposed project site) and national (the impact could be as far reaching as to international boundaries).

The physical and spatial extent of an impact is a description of whether the impact would occur on a scale described as follows:

- ***Site*** – if an impact would affect the whole or measurable portion of the site.
- ***Local*** – if an impact would be limited to the immediate area of the proposed project, or if the impact would affect the extended area adjacent to the site, perhaps a neighborhood or small town or if it would affect environments up to 15km outside the immediate environment.
- ***Regional*** – if an impact would affect areas including outlying areas of the city, transport routes and adjoining towns; and
- ***National*** – the impact could be as far reaching as to international boundaries.

6.4.5 Duration

This is the time frame within which the impact would be experienced. It defines the impact's lifetime and can be classified as temporary, short term, medium term, long term and permanent.

6.4.6 Frequency

Defines the number of times an impact occurs per given time period. This could be daily, weekly, monthly and yearly.

6.4.7 Likelihood

The probability of an impact occurring is given or measured by its likelihood. Under likelihood, the impact could be categorized as possible, certain, unlikely and definite.

6.4.8 Magnitude

Refers to the strength which an impact will have on the receiving environment (receptor).

Table 21 Impact factor definition

Impact Factor	Meaning
Magnitude	Refers to the strength with which an impact will have on the receptor.
Likelihood	The probability of an impact taking place.
Extent	The scope in space or geographical cover of the impact.
Frequency	The number of times or how often an impact is likely to occur.
Duration	The extent in terms of time.

Table 22 Impact factor significant scale

Characterization					
Scale	**1**	**2**	**3**	**4**	**5**
Likelihood	Impossible	Highly unlikely	Unlikely	Likely	Certain
Extent	Site specific	Local	Regional	National	International
Frequency	Annually	Bi-annually	Monthly	Weekly	Daily
Duration	Temporary	Short term	Medium term	Long term	Permanent
Magnitude	Negligible	Minor	Marginal	Significant	Catastrophic

Table 23 Other considerations in impact evaluation

Characteristic	Classification	
Impact type	Positive	Negative
Reversible	Yes	No
Residual	Yes	No
Cumulative	Yes	No
Way of affecting	Direct	Indirect
Further studies required	Yes	No

6.4.9 Reversible Impacts

These are effects of a process or condition capable of being reversed so that the previous state is restored. After an impact has occurred, the possibility of the impact being restored to the original status before the action that resulted into that impact. The ability to turn the effect on the environment or the people the other way round is the reversibility.

6.4.10 Residual Impacts

Residual impacts are defined as those impacts that remain following the implementation of the mitigation measures proposed. Or *RESIDUAL IMPACTS* refer to those environmental effects predicted to remain after the application of mitigation measures outlined in the EIA. The predicted *RESIDUAL EFFECTS* will be considered for each project phase (construction, operation, decommissioning/post-decommissioning, and unplanned events).

6.4.11 Cumulative impacts

These are impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what Agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. *CUMULATIVE EFFECTS* are changes to the environment that are caused by an action in combination with other past, present and future human actions. Over time, direct and indirect human activities combine to collectively impact the environment.

6.4.12 Irreversible impacts

These are impacts caused on the environment or people and cannot be restored to the original status. Irreversible impacts are just the opposite of reversible impacts and cannot be turned around. Thus, irreversible impacts may be defined as those capable of changing or producing a change in one direction only.

6.4.13 Impact Significance

A scale of 1 – 5 was used to calculate the environmental risk in terms of magnitude, extent, duration, likelihood and frequency.

The results were multiplied and then added as shown in the formulae and in Table 12 and 13 below.

Impact Significance = (M+D+E) x (F+L)

Where:

M = Magnitude
D = Duration
E = Extent
F = Frequency
L = Likelihood

Table 24 Significant analysis matrix table

	(Magnitude) + (Extent) + (Duration)														
(Likelihood) + (Frequency)	1	2	3	4	5	6	7	8	9	10	11	12	13	25	15
	2	4	6	8	10	12	25	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	25	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	250	150

Table 25 Impact Significance rating

Significance	Matrix Value	Negative Impact Measure	Positive Impact Enhancement Measure
Very Low	1 - 30	Propose mitigation measures	Enhance
Low	31 - 60	Propose mitigation measures	Enhance
Medium	61 - 90	Propose mitigation measures	Maintain
High	91 - 120	Propose mitigation measures and pay more attention	Maintain
Very High	121 - 150	High risk area, propose mitigation measures and have high monitoring frequency	Maintain

Table 26 Evaluation of Impacts

Category	Impact	Phase	Nature	Direct/Indirect	Significance
Biophysical Environment	Enhanced Ore Recovery Efficiency & Waste Reduction	Operation	Positive	Direct	High
	Reduction of Ore Wastage & Acid Consumption	Operation	Positive	Direct	High
	Reduced Pressure on Primary Ore Deposits	Operation	Positive	Indirect	High
	Soil Quality Degradation & Erosion	Construction	Negative	Direct	Medium
	Soil Acidification	Operation	Negative	Direct	Medium
	Acid Fume Release	Operation	Negative	Direct	High
	Fugitive Dust Emissions	Construction	Negative	Direct	High
	Fugitive Dust Emissions	Operation	Negative	Direct	Medium
	Surface Water Contamination	Construction	Negative	Direct	Medium
	Surface Water Contamination	Operation	Negative	Direct	Medium
	Groundwater Contamination	Operation	Negative	Direct	High
	Risk to Aquatic Ecosystems (Luela Stream)	Operation	Negative	Indirect	Medium
	Hazardous & Solid Waste Generation	Operation	Negative	Direct	High
	Electronic Waste (E-Waste) Generation	Construction/Operation	Negative	Indirect	Medium
	Noise & Vibration	Construction	Negative	Direct	Medium
	Noise & Vibration	Operation	Negative	Direct	Medium
	Visual & Aesthetic Changes	Construction/Operation	Negative	Direct	Medium
	Pipeline Leakage or Burst	Operation	Negative	Direct	Medium
	Electrolyte & Sludge Disposal	Operation	Negative	Direct	Medium
	Chemical Handling & Storage Hazards	Operation	Negative	Direct	High
	Infrastructure Corrosion	Operation	Negative	Indirect	Medium
	Power Supply Disruptions & Energy Demand	Operation	Negative	Direct	Medium
Socio-Economic & Cultural Environment	Employment Opportunities	Construction	Positive	Direct	High
	Employment Opportunities	Operation	Positive	Direct	High
	Boost to Local Businesses	Construction/Operation	Positive	Indirect	Medium

	Infrastructure Development	Construction	Positive	Direct	Medium
	Skills & Technology Transfer	Operation	Positive	Direct	Medium
	Tax & Royalty Revenue	Operation	Positive	Direct	High
	Improved Community Livelihoods	Operation	Positive	Indirect	Medium
	Occupational Health & Safety Risks	Construction/Operation	Negative	Direct	High
	Public Health Concerns (Respiratory, Waterborne, Vector-Borne)	Operation	Negative	Indirect	Medium
	Increased Risk of Communicable Diseases (HIV/AIDS & STIs)	Construction/Operation	Negative	Indirect	Medium
	Community Safety Risks from Transport	Construction	Negative	Direct	Medium
	Community Safety Risks from Transport	Operation	Negative	Direct	Medium
	Resettlement & Land Acquisition	Construction	Negative	Direct	Medium-High
	Economic Displacement (No Physical Resettlement)	Construction/Operation	Negative	Indirect	Medium
	Land Use Change & Resource Access	Construction	Negative	Direct	Medium-High
	Loss of Access to Land & Natural Resources	Operation	Negative	Indirect	Medium
	Inflation of Local Goods & Housing	Construction/Operation	Negative	Indirect	Medium
	Gender & Vulnerable Group Exclusion	Operation	Negative	Indirect	Medium
	Inequitable Benefit Distribution	Operation	Negative	Indirect	Medium
	Occupational Fatigue & Process Errors	Operation	Negative	Indirect	Medium
	Security & Vandalism Risks	Operation	Negative	Indirect	Medium

7.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental Impact Assessment (EIA) Regulations, Statutory Instrument No. 28 of 1997, require a project proponent to prepare and implement an Environmental and Social Management and Monitoring Plan (ESMP) for any proposed development. The ESMP outlines mitigation, monitoring, institutional responsibilities, and reporting mechanisms necessary to prevent, minimise, or manage adverse environmental and social impacts throughout the project lifecycle.

RongXing Investment Limited will implement this ESMP for the construction, operation, and eventual decommissioning of the hydrometallurgical copper processing expansion project located within the Chambishi Industrial Area. The ESMP will ensure compliance with national environmental legislation, ZEMA licence conditions, and applicable international good practice. Periodic internal audits and regulatory inspections will be conducted to verify compliance and continuous improvement.

7.1 Management Commitments for Enhancing Positive Impacts

Improved Waste and Effluent Management (SX–EW Operations)

- RongXing will implement a closed-loop water circulation system within the acid curing, leaching, CCD, SX, and EW circuits to maximise water reuse and minimise freshwater abstraction.
- RongXing will ensure all process solution ponds, raffinate ponds, and electrolyte storage areas are fitted with impermeable liners and secondary containment to prevent seepage into soil and groundwater.
- RongXing will be undertaking routine monitoring of effluent quality parameters (pH, conductivity, flow rate, dissolved metals) at critical control points, with corrective actions triggered immediately where deviations occur.
- RongXing will ensure sludge and solid residues generated from the hydrometallurgical process is handled, stored, and disposed of in accordance with ZEMA-approved waste management procedures.

Employment Creation and Economic Growth

- RongXing will prioritise local employment during both construction and operation, with

emphasis on recruiting from surrounding communities within Kalulushi District.

- RongXing will ensure special consideration is given to women and youth, supported by targeted recruitment and skills development initiatives.
- RongXing will implement structured training programmes in areas such as plant operation, laboratory analysis, environmental monitoring, and occupational safety.
- RongXing will establish clear internal progression pathways to enable local employees to advance into skilled and supervisory positions.

Local Business Development

- RongXing will promote local procurement of goods and services where feasible, including construction materials, catering, transport, and maintenance services.
- RongXing will provide capacity-building support and mentorship to eligible local suppliers to improve quality standards and participation in the project supply chain.
- Where applicable, RongXing will ensure shared infrastructure improvements (e.g. access roads) are coordinated with local authorities to benefit both the project and neighbouring communities.
- RongXing will ensure Corporate Social Responsibility (CSR) initiatives is guided through structured stakeholder engagement processes to ensure alignment with community priorities.

Gender and Youth Inclusion

- RongXing will implement inclusive employment policies, ensuring equitable participation of women and youth in both skilled and semi-skilled roles.
- RongXing will introduce flexible work arrangements and appropriate workplace facilities to support female participation.
- RongXing will establish partnerships with vocational institutions and NGOs to deliver targeted training, apprenticeships, and entrepreneurship support for youth and vulnerable groups.

7.2 Management Commitments for Mitigating Negative Impacts

Soil Degradation and Acidification

- RongXing will ensure topsoil is stripped, stockpiled, and protected during construction, and reused during site rehabilitation where applicable.
- RongXing will ensure areas exposed to acid spill risks are protected by bunded containment systems and impermeable surfaces.
- RongXing will be undertaking routine soil monitoring, and neutralising agents (e.g. lime) will be applied applied where acidification risks are identified.

Surface and Groundwater Protection

- RongXing will equip all chemical storage and handling areas with secondary containment, leak detection, and spill response infrastructure.
- RongXing will manage stormwater and contact water through controlled drainage systems and sedimentation structures prior to reuse or approved discharge.
- RongXing will be conducting groundwater monitoring boreholes, upstream and downstream of process facilities and sampled regularly for acidity, conductivity, and metal concentrations.
- RongXing will maintain buffer zones around nearby watercourses to prevent contamination from construction and operational activities.

Air Quality, Dust, and Acid Mist

- RongXing will implement dust suppression measures, including water spraying and controlled material handling, during construction and operation
- RongXing will ensure acid curing and SX–EW areas is fitted with appropriate ventilation and mist suppression systems.
- RongXing will undertake ambient air quality monitoring periodically to verify compliance with regulatory limits.

Hazardous, Solid, and Electronic Waste Management

- RongXing will maintain a comprehensive waste inventory covering hazardous, non-hazardous,

and electronic waste streams.

- RongXing will ensure all hazardous and electronic waste is handled by ZEMA-licensed waste management contractors.
- RongXing will ensure on-site waste segregation and temporary storage facilities are clearly marked and managed to prevent cross-contamination.

Pipeline and Process Safety

- RongXing will design process pipelines with appropriate materials, pressure ratings, and secondary containment where required.
- RongXing will be conducting routine inspections and preventative maintenance to detect leaks or corrosion.
- RongXing will implement emergency shut-off systems and spill response procedures for all critical process lines.

Occupational Health and Safety (OHS)

- RongXing will appoint qualified safety personnel responsible for enforcing OHS standards across all project phases.
- RongXing will provide comprehensive PPE to all workers based on task-specific risk assessments.
- RongXing will conduct regular emergency response drills, covering scenarios such as chemical spills, fire, and transport incidents.
- RongXing will provide adequate rest, hydration, and welfare facilities to minimise fatigue-related risks.

Public Health and Community Safety

- RongXing will undertake regular monitoring of water quality in nearby community water sources, with alternative water supplies provided if contamination is detected.
- RongXing will implement health awareness programmes addressing communicable diseases, hygiene, and occupational health in collaboration with local health authorities.

- RongXing will enforce traffic management measures to reduce accident risks associated with increased vehicle movement.

Land Use, Access, and Livelihood Impacts

- RongXing will undertake participatory land-use mapping and stakeholder consultations prior to construction to identify and manage access concerns.
- RongXing will implement where land access is restricted, alternative livelihood support initiatives (e.g. agroforestry, aquaculture, beekeeping).
- RongXing will maintain a functional Grievance Redress Mechanism (GRM) to address land, access, and compensation-related complaints transparently and efficiently.

Noise and Vibration

- RongXing will ensure equipment is maintained to manufacturer specifications to minimise noise generation.
- RongXing will restrict high-noise activities to daytime hours where practicable.
- RongXing provide workers exposed to elevated noise levels with appropriate PPE, and exposure times will be managed through task rotation.

Social Equity, Security, and Conflict Prevention

- RongXing will implement transparent recruitment, procurement, and CSR processes will be implemented to reduce perceptions of inequitable benefit distribution.
- RongXing will ensure a Local Stakeholder Liaison Committee meet regularly to review grievances, employment statistics, and community concerns.

RongXing will implement site security measures using community-sensitive approaches to prevent vandalism and theft while maintaining positive community relations

7.3 Environmental and Social Monitoring Plan

An Environmental Management and Monitoring Plan is laid out in the table below. Overall responsibility for Environmental Management at all project phases will be that of RongXing Investment Limited. Compliance with relevant Health, Safety and Environmental standards during construction will be the prime responsibility of RongXing Investment Limited. During operation, the Site Manager will be fully responsible for the implementation of Environmental Management and Monitoring activities and ensuring full compliance with Health, Safety and Environmental standards.

Table 27 Environmental and social Management and Monitoring Plan

Category	Aspect	Impact	Project Phase	Mitigation/Enhancement Measure	Monitoring Frequency	Time Frame	Performance Indicator	Responsible Person	Cost (ZMW)
Biophysical Environment	Resource efficiency	Enhanced ore recovery efficiency and waste reduction (Positive)	Operation	RongXing will routinely calibrate and optimise the acid curing, wet screening, and agitation systems (mixers, conveyors, dosing units and sensors) to maintain optimal moisture and acid dosing; RongXing will implement PLC/SCADA automation for controlled curing conditions and stable metallurgical response; RongXing will manage raffinate and process solutions only within engineered, lined and bunded circuits to prevent losses and uncontrolled discharge; RongXing will maximise internal recycling of process solutions through closed-loop return systems to reduce freshwater abstraction and effluent generation; RongXing will continuously monitor pH, conductivity, flow rates and Cu tenor with alarms and corrective protocols to prevent process upsets, spills or over-acidification.	Daily (process control), Monthly (review)	Operation (continuous)	Copper recovery meets target; raffinate losses reduced; zero uncontrolled discharge; stable process parameters within control bands	Plant Manager / Metallurgist	18,000

Biophysical Environment	Reagent efficiency	Reduction of ore wastage and acid consumption (Positive)	Operation	RongXing will conduct routine process optimisation and performance audits to benchmark acid consumption per tonne of ore; RongXing will control acid addition through PLC-based dosing systems linked to real-time pH, slurry density and solution strength; RongXing will train operators on stoichiometric dosing, reagent efficiency and chemical loss prevention; RongXing will analyse leaching performance, raffinate strength and recovery trends and adjust curing/leach parameters to reduce ore wastage and reagent loss.	Weekly (acid/ore KPIs), Monthly (audit)	Operation (continuous)	Acid consumption (kg/t) reduced; improved leach efficiency; stable pH and density; reduced unreacted residues	Metallurgist / Process Engineer	15,000
Biophysical Environment	Resource conservation	Reduced pressure on primary ore deposits (Positive)	Construction & Operation	RongXing will establish formal MoUs and sourcing agreements with approved operators for tailings and overburden supply; RongXing will conduct baseline characterisation and periodic monitoring of sourced materials (Cu tenor, acid-generating potential, contaminants); RongXing will maintain traceability documentation and material tracking throughout the supply	Per consignment + Quarterly	Construction–Operation	Traceability records complete; material characterisation reports available; no new liabilities created at source	Supply Chain Manager / Environmental Officer	12,000

				chain; RongXing will align sourcing, where feasible, with partner rehabilitation objectives to support stabilisation and progressive restoration.					
Biophysical Environment	Soil quality	Soil degradation and acidification (Negative)	Construction & Operation	RongXing will strip and stockpile topsoil in fenced, demarcated areas and protect it from erosion/contamination for later rehabilitation; RongXing will install bunded and lined containment beneath acid tanks, chemical storage and solution transfer points and maintain these throughout operation; RongXing will construct major acid and slurry pipelines using corrosion-resistant/double-walled systems with leak detection; RongXing will store neutralising agents (lime/soda ash) on site and apply immediately after any acid spill; RongXing will conduct periodic soil sampling in high-risk zones and implement ZEMA-approved remediation where anomalies occur.	Weekly inspections; Quarterly soil sampling; Incident-based	Construction–Operation	Zero uncontrolled spills; soil pH remains within baseline range; remediation completed within set timelines	Environmental Manager / Maintenance Supervisor	28,000
Biophysical Environment	Erosion control	Soil erosion induced by construction activities (Negative)	Site prep & Construction	RongXing will implement phased clearing to limit exposed soil; RongXing will strip and protect topsoil stockpiles for later reuse; RongXing will	Weekly; After heavy rainfall	Site prep–Construction	No active gullying; sediment controls intact; visible sedimentation minimized	Construction Manager / Environmental Officer	22,000

				install silt fences, sediment traps and diversion drains to control runoff and sediment transport; RongXing will stabilise disturbed surfaces through compaction, gravelling or temporary vegetation; RongXing will implement stormwater controls and inspect/repair erosion structures after heavy rainfall; RongXing will revegetate disturbed areas with native grasses to restore stability.					
Biophysical Environment	Air quality	Acid fume release (Negative)	Construction & Operation	RongXing will fit vapour arrestors, vent scrubbers and pressure relief systems on acid tanks and vessels; RongXing will install automated level sensors and alarms to prevent overfilling and emissions; RongXing will restrict acid transfer activities to trained and authorised personnel using PPE and SOPs; RongXing will enclose/vent acid transfer lines to local fume extraction where required; RongXing will undertake continuous/periodic air monitoring and operational audits to confirm compliance with exposure limits.	Daily checks; Monthly monitoring	Construction–Operation	Acid mist within OELs; zero uncontrolled releases; SOP compliance verified	HSE Manager / Process Supervisor	20,000

Biophysical Environment	Surface water	Surface water contamination (Negative)	Construction & Operation	RongXing will construct HDPE-lined impermeable pads and bunds in acid curing, chemical storage and process areas; RongXing will direct stormwater through sedimentation, neutralisation and interceptor systems before controlled discharge; RongXing will roof and fully contain acid curing and reagent handling areas to prevent rainfall contact; RongXing will store hazardous wastes in bunded facilities and dispose through approved routes; RongXing will monitor upstream/downstream water quality and implement rapid containment/corrective actions when triggers are exceeded.	Monthly sampling; Weekly inspections	Construction–Operation	Upstream/downstream results compliant; no bypass runoff; timely corrective actions	Environmental Manager	30,000
Biophysical Environment	Groundwater	Groundwater contamination (Negative)	Construction & Operation	RongXing will install and maintain monitoring boreholes/piezometers upgradient and downgradient of the facility; RongXing will ensure secondary containment (bunds/double walls) for critical tanks and transfer points; RongXing will sample groundwater for pH and metals and review trends against limits;	Quarterly sampling; Monthly inspections	Construction–Operation	Borehole results within limits; no increasing trend; response within 48 hrs where anomalies occur	Environmental Manager / Hydrogeologist	45,000

				RongXing will implement rapid remediation (neutralisation, excavation or containment) when contamination is detected; RongXing will conduct preventive inspection and maintenance of pipelines, pumps and tanks to reduce leak risk.					
Biophysical Environment	Air quality	Fugitive dust emissions (Negative)	Construction & Operation	RongXing will install mist sprayers/water sprays and partial enclosures at conveyors, hoppers and transfer chutes; RongXing will gravel or treat internal roads and enforce speed limits to reduce dust from traffic; RongXing will establish vegetative windbreaks/buffer zones around stockpiles and plant boundaries; RongXing will inspect and maintain dust suppression systems and trigger corrective actions based on observations or complaints; RongXing will train workers in dust control practices including minimising drop heights during transfer.	Daily checks; Monthly PM checks	Construction–Operation	Visible dust minimized; PM levels within targets; reduced complaints	HSE Manager / Operations Supervisor	25,000
Biophysical Environment	Biodiversity	Habitat fragmentation and faunal disturbance (Negative)	Site prep, Construction & Operation	RongXing will conduct pre-construction ecological walkovers to identify sensitive areas and nesting sites; RongXing will minimise clearing footprints and retain vegetation along	Pre-clear; Quarterly monitoring	Site prep–Operation	Buffers maintained; rehabilitation survival >70%; no recorded destruction of active nests	Environmental Officer / Contractor Supervisor	10,000

				drainage lines and boundaries where feasible; RongXing will schedule disruptive works to avoid peak nesting periods where practicable; RongXing will rehabilitate disturbed areas using native species to restore habitat connectivity; RongXing will monitor fauna presence and habitat recovery and implement adaptive measures if disturbance is observed.					
Biophysical Environment	Vegetation/soil	Loss of vegetation and topsoil (Negative)	Site prep & Construction	RongXing will strip, label and stockpile topsoil in fenced areas and protect it from erosion; RongXing will install erosion/sediment controls around cleared areas; RongXing will implement progressive rehabilitation and reapply topsoil promptly after works; RongXing will revegetate cleared areas with native grasses, shrubs and trees; RongXing will monitor plant establishment and apply supplementary planting/soil amendments where needed.	Weekly inspections; Quarterly review	Site prep–Construction	Topsoil conserved; % rehabilitated increases; vegetation cover targets met	Environmental Officer / Construction Manager	18,000
Biophysical Environment	Visual amenity	Visual and landscape impact (Negative)	Construction & Operation	RongXing will maintain buildings, structures and perimeter fencing in good condition through regular cleaning and painting; RongXing will plant	Monthly inspections	Construction–Operation	Visual screening established; glare complaints reduced; housekeeping score meets target	Facilities Manager / Environmental Officer	8,000

				native vegetation along perimeters and around stockpiles to screen infrastructure; RongXing will apply low-glare, directional LED lighting to minimise night-time glare; RongXing will implement phased landscaping early in construction and operation to establish visual buffers.					
Biophysical Environment	Noise/vibration	Noise and vibration pollution (Negative)	Construction & Operation	RongXing will install acoustic enclosures/sound dampening structures for crushers and mixers; RongXing will provide and enforce hearing protection and train workers on its use; RongXing will restrict heavy machinery operation primarily to daytime hours where practicable; RongXing will maintain equipment to reduce excessive noise/vibration; RongXing will undertake periodic noise monitoring at plant boundaries and nearby receptors and implement corrective actions if exceedances occur.	Quarterly monitoring; Monthly maintenance	Construction–Operation	Receptor noise complies; PPE compliance >95%; complaints resolved	HSE Manager / Maintenance Manager	18,000
Biophysical Environment	Waste	Hazardous and solid waste generation (Negative)	Construction & Operation	RongXing will implement a waste inventory and tracking system for all waste streams; RongXing will segregate wastes and store them in labelled,	Weekly inspections; Quarterly audits	Construction–Operation	Manifests available; no illegal dumping; audit close-out rate >90%	Environmental Manager / Stores Officer	20,000

				bunded facilities; RongXing will establish a dedicated hazardous waste storage bay; RongXing will neutralise/stabilise/recycle wastes where feasible and dispose via approved contractors; RongXing will conduct inspections and compliance audits and close out corrective actions.					
Biophysical Environment	Waste	Electronic waste (E-waste) (Negative)	Construction & Operation	RongXing will maintain an asset lifecycle inventory for PLCs, sensors and control equipment; RongXing will refurbish or upgrade electronics where feasible to reduce disposal volumes; RongXing will store e-waste securely and transfer only to licensed recyclers; RongXing will train staff on segregation and safe handling; RongXing will retain disposal certificates and audit records.	Semi-annually	Construction–Operation	Disposal certificates available; inventory complete; no improper disposal	IT/Instrumentation Lead / Environmental Officer	6,000
Biophysical Environment	Chemical safety	Chemical handling and storage hazards (Negative)	Construction & Operation	RongXing will install acid-resistant storage tanks with fail-safe shutoff valves and overfill protection; RongXing will equip systems with leak/pressure/temperature alarms; RongXing will train personnel on chemical safety, spill response and emergency	Weekly inspections; Quarterly drills	Construction–Operation	Zero major chemical incidents; audit actions closed; training coverage >95%	HSE Manager / Plant Manager	30,000

				procedures; RongXing will install bunds/lined sumps and secondary containment at chemical areas; RongXing will conduct periodic third-party audits and implement corrective actions.					
Biophysical Environment	Waste/effluent	Electrolyte and sludge disposal (Negative)	Operation	RongXing will neutralise and recycle spent electrolyte where feasible; RongXing will collect sludge in leak-proof, bunded containers and send it to approved facilities; RongXing will monitor soils around EW units for metal accumulation; RongXing will train operators on safe handling and spill prevention and maintain disposal manifests.	Monthly checks; Quarterly soil sampling	Operation	EW area leak-free; manifests complete; soil results stable and compliant	Metallurgist / Environmental Officer	12,000
Biophysical Environment	Energy	Power supply disruptions and energy demand (Negative)	Construction & Operation	RongXing will install backup generators sized for critical units and conduct monthly load testing; RongXing will install IE3 motors and VFDs to optimise energy use; RongXing will implement PLC/UPS-based safe shutdown to prevent overflows; RongXing will coordinate operations with grid availability and maintain electrical systems to reduce outage impacts.	Monthly tests; Continuous alarms	Construction–Operation	No uncontrolled releases during outages; downtime reduced; test logs complete	Electrical Engineer / Plant Manager	35,000

Biophysical Environment	Infrastructure	Corrosion of infrastructure (Negative)	Construction & Operation	RongXing will construct exposed structures and pipework using corrosion-resistant materials and protective linings; RongXing will apply anti-corrosive coatings and barriers where required; RongXing will conduct routine inspections and preventive maintenance with timely replacement of damaged components; RongXing will channel chemical runoff to neutralisation sumps to protect foundations.	Monthly inspections	Construction–Operation	Corrosion defects reduced; timely repairs; no structural failures	Maintenance Manager	10,000
Biophysical Environment	Aquatic ecology	Risk to aquatic ecosystems (Luela Stream) (Negative)	Construction & Operation	RongXing will install perimeter drains and chemical/oil interceptors around acid-handling and stockpile zones; RongXing will maintain vegetated buffers and sediment controls to reduce sediment transport; RongXing will implement emergency spill containment with booms and neutralisation kits; RongXing will monitor stream quality upstream/downstream and implement immediate corrective actions when triggers are exceeded.	Monthly sampling; After storms/incidents	Construction–Operation	Stream results compliant; no visible plumes/sheens; response within target	Environmental Manager	32,000
Biophysical Environment	Process integrity	Pipeline leakage or burst (Negative)	Construction & Operation	RongXing will install critical process lines in dual configurations with auto-switch valves; RongXing will construct	Continuous sensors; Monthly inspections; Quarterly drills	Construction–Operation	Zero uncontrolled releases; sensors functional; drill performance meets target	Maintenance Manager / HSE Manager	25,000

				pipelines using HDPE/acid-resistant materials; RongXing will install flow/pressure sensors with automatic shutdown; RongXing will provide containment trenches/sumps along routes; RongXing will conduct quarterly drills and routine inspections/pressure tests.					
Biophysical Environment	Fire safety	Fire and explosion risks (SX solvents) (Negative)	Construction & Operation	RongXing will implement hazardous area zoning and install ATEX-rated fittings in SX areas; RongXing will install foam/CO_2/dry chemical firefighting systems and maintain ventilation; RongXing will conduct quarterly fire drills with local authorities; RongXing will train operators in flammable liquid handling and emergency response; RongXing will inspect fire systems, tanks and piping routinely.	Quarterly drills; Monthly inspections	Construction–Operation	Fire systems serviceable; drill targets met; zero ignition incidents	HSE Manager / SX Supervisor	28,000
Socio-economic & Cultural	Employment	Employment creation (Positive)	All phases	RongXing will develop and enforce a Local Employment Policy prioritising nearby communities; RongXing will provide targeted technical training (screening, pumping, acid handling, monitoring); RongXing will partner with TEVET/vocational	Quarterly reporting	Construction–Operation	% local hires meets target; training hours delivered; equitable recruitment records	HR Manager / Community Liaison Officer	12,000

				centres for apprenticeships; RongXing will maintain gender- and skill-disaggregated employment records; RongXing will conduct community recruitment drives and communicate requirements transparently.					
Socio-economic & Cultural	Local economy	Local business growth (Positive)	Construction & Operation	RongXing will prioritise local procurement for goods/services where competitive; RongXing will offer longer-term service contracts to qualified local suppliers; RongXing will conduct supplier workshops on quality, H&S and financial management; RongXing will maintain procurement records to track SME participation and improve performance.	Quarterly	Construction–Operation	Local procurement %; number of SMEs contracted; supplier compliance	Procurement Manager	10,000
Socio-economic & Cultural	Infrastructure	Infrastructure development (Positive)	Construction & Operation	RongXing will upgrade and maintain shared access roads (grading, drainage, dust control); RongXing will implement road safety signage and speed controls; RongXing will engage authorities on controlled community access to borehole water where feasible and agreed.	Monthly checks; Quarterly review	Construction–Operation	Road condition maintained; reduced incidents; agreements documented	Construction Manager / Community Liaison	18,000
Socio-economic & Cultural	Human capital	Skills and technology transfer (Positive)	Construction & Operation	RongXing will implement internship and attachment programmes; RongXing will deliver structured on-	Semi-annually	Construction–Operation	Number trained/certified; competency matrix	HR Manager / Training Coordinator	15,000

				the-job training and mentoring across plant areas; RongXing will support staff professional certification; RongXing will keep competency matrices and refresher training records.			completed; fewer operator errors		
Socio-economic & Cultural	Public finance	Tax and royalty revenue (Positive)	Operation	RongXing will maintain transparent fiscal reporting and statutory submissions; RongXing will comply with ZRA reporting and timely payments; RongXing will maintain auditable financial records and controls.	Annual	Operation	Statutory compliance maintained; timely submissions and payments	Finance Manager	5,000
Socio-economic & Cultural	Livelihoods	Improved community livelihoods (Positive)	Construction & Operation	RongXing will implement a local procurement policy for consumables and services; RongXing will support enterprise development through training and mentorship; RongXing will target women, youth and vulnerable groups in programmes; RongXing will monitor outcomes through consultations and annual surveys and adjust interventions.	Quarterly engagement; Annual survey	Construction–Operation	Livelihood support delivered; satisfaction improves; women/youth participation increases	Community Liaison Officer	10,000
Socio-economic & Cultural	OHS	Occupational health and safety risks (Negative)	All phases	RongXing will provide task-specific PPE and enforce use; RongXing will install engineering controls (enclosures, ventilation, fume extraction); RongXing will implement medical	Daily supervision; Quarterly monitoring	Construction–Operation	Reduced LTIs; exposure within limits; PPE compliance >95%	HSE Manager / Clinic Nurse	40,000

				surveillance; RongXing will conduct exposure monitoring and keep records; RongXing will provide emergency showers/eyewash and first aid; RongXing will implement incident reporting and corrective actions.					
Socio-economic & Cultural	Community health	Public health concerns (respiratory, waterborne, vector-borne) (Negative)	Construction & Operation	RongXing will implement dust suppression and site hygiene controls; RongXing will prevent stagnant water through drainage maintenance and pond treatment; RongXing will conduct health awareness with health authorities; RongXing will monitor water quality and provide alternatives if contamination occurs; RongXing will maintain on-site medical support and outbreak response.	Monthly inspections; Quarterly outreach	Construction–Operation	Reduced disease reports; compliant water results; outreach delivered	HSE Manager / Community Liaison	20,000
Socio-economic & Cultural	Transport safety	Community safety risks from transport (Negative)	Construction & Operation	RongXing will enforce designated haul routes in consultation with authorities; RongXing will equip vehicles with GPS, spill kits, extinguishers and signage; RongXing will implement speed controls and pedestrian safety measures; RongXing will train drivers in hazardous materials transport and defensive driving;	Daily checks; Monthly audits	Construction–Operation	Reduced incidents; driver compliance; emergency response readiness	Logistics Manager / HSE Manager	25,000

				RongXing will coordinate emergency preparedness and carry out compliance audits.					
Socio-economic & Cultural	Communicable diseases	Increased risk of STIs and HIV/AIDS (Negative)	Construction & Operation	RongXing will implement an HIV/AIDS and STI prevention programme including awareness, counselling and referrals; RongXing will support distribution of protective materials; RongXing will enforce confidentiality and non-discrimination policies; RongXing will conduct periodic community sessions and track participation indicators.	Quarterly	Construction–Operation	Sessions conducted; participation rates; referral uptake	HR Manager / Community Liaison	8,000
Socio-economic & Cultural	Resettlement	Resettlement and land acquisition (Negative)	Pre-construction & Construction	RongXing will prepare and implement a RAP if displacement occurs; RongXing will conduct PAP census and asset inventory; RongXing will pay compensation at replacement cost before displacement; RongXing will provide livelihood restoration; RongXing will operate a GRM and undertake independent monitoring.	Monthly during RAP	Pre-construction–Construction	Compensation paid before impacts; RAP milestones met; grievances resolved	Social Specialist / Legal Officer	30,000
Socio-economic & Cultural	Land use	Land use conflicts (Negative)	Pre-construction & Construction	RongXing will verify tenure through cadastral checks and participatory mapping; RongXing will consult early with formal and informal users; RongXing will implement a GRM for disputes;	Monthly engagement; Quarterly review	Pre-construction–Construction	Reduced disputes; resolution time within target; agreements documented	Community Liaison Officer	12,000

				RongXing will coordinate with authorities and traditional leadership for resolution and monitoring.					
Socio-economic & Cultural	Livelihoods	Economic displacement without resettlement (Negative)	Pre-construction & Construction & Operation	RongXing will identify economically displaced persons through surveys; RongXing will provide compensation and livelihood restoration support; RongXing will deliver vocational training relevant to local economy; RongXing will monitor income recovery and adapt interventions; RongXing will maintain continuous consultation with affected persons.	Quarterly	Pre-construction–Operation	Income restoration achieved; training completed; grievances reduced	Social Specialist / Community Liaison	20,000
Socio-economic & Cultural	Resource access	Land use change and resource access restrictions (Negative)	Construction & Operation	RongXing will undertake participatory land-use mapping to identify critical resources; RongXing will optimise facility layout to reduce land take where feasible; RongXing will maintain or re-route safe access corridors where practicable; RongXing will implement alternative livelihood programmes and review outcomes annually.	Semi-annually	Construction–Operation	Access arrangements implemented; programme participation; reduced complaints	Community Liaison Officer	15,000
Socio-economic & Cultural	Transport safety	Transport hazards (Negative)	Construction & Operation	RongXing will develop and implement a Traffic Management Plan; RongXing will equip vehicles with GPS and speed governors; RongXing will conduct	Weekly checks; Monthly audits	Construction–Operation	TMP compliance; fewer incidents; inspection pass rate	Logistics Manager	12,000

				random inspections and compliance audits; RongXing will train drivers on emergency response; RongXing will maintain spill kits and first aid resources and conduct community awareness on routes/schedules.					
Socio-economic & Cultural	Inclusion	Gender and vulnerable group exclusion (Negative)	Construction & Operation	RongXing will implement a Gender and Social Inclusion Policy with measurable participation targets; RongXing will ensure recruitment is transparent and locally advertised; RongXing will provide targeted training and mentorship for women and youth; RongXing will enforce zero tolerance to harassment with confidential reporting; RongXing will track gender-disaggregated employment data and adjust strategies.	Quarterly	Construction–Operation	Increased women/youth participation; training outputs; resolved cases within timelines	HR Manager / Social Officer	10,000
Socio-economic & Cultural	Social cohesion	Inequitable benefit distribution (Negative)	Construction & Operation	RongXing will conduct stakeholder mapping and ensure inclusive participation; RongXing will establish a liaison committee to review jobs/procurement/CSR quarterly; RongXing will disclose criteria for benefit allocation; RongXing will maintain a GRM and undertake	Quarterly committee; Annual survey	Construction–Operation	Reduced grievances; improved satisfaction score; transparent records maintained	Community Liaison Officer	12,000

				annual satisfaction surveys; RongXing will adjust benefit-sharing based on monitoring and feedback.					
Socio-economic & Cultural	Energy	Power supply disruptions (Negative)	Operation	RongXing will maintain backup generators and conduct monthly load tests; RongXing will install UPS for critical control systems and implement safe shutdown modes; RongXing will coordinate with grid provider to reduce outage risks; RongXing will maintain critical spares and preventative electrical maintenance.	Monthly tests; Continuous alarms	Operation	Reduced downtime; no overflows/spills during outages; logs complete	Electrical Engineer / Plant Manager	15,000
Socio-economic & Cultural	Cost of living	Inflation of local goods and housing (Negative)	Construction & Operation	RongXing will phase workforce mobilisation to avoid sudden influx; RongXing will assess managed accommodation options where feasible; RongXing will prioritise local food procurement to stabilise demand; RongXing will monitor prices with local leadership and adjust workforce arrangements if inflation trends emerge.	Quarterly	Construction–Operation	Stable price trends; reduced complaints; increased local sourcing	HR Manager / Community Liaison	6,000
Socio-economic & Cultural	Human factors	Occupational fatigue and process errors (Negative)	Construction & Operation	RongXing will implement controlled shift schedules and mandatory rest breaks; RongXing will apply a fatigue management system with overtime control; RongXing will maintain	Daily supervision; Monthly review	Construction–Operation	Reduced near misses; overtime controlled; fatigue observations corrected	HSE Manager / Operations Manager	8,000

				automation (PLC/SCADA) to reduce manual errors; RongXing will conduct daily safety walkabouts and provide welfare facilities; RongXing will train workers in fatigue recognition.					
Socio-economic & Cultural	Security	Security and vandalism (Negative)	Construction & Operation	RongXing will install perimeter fencing, controlled gates, lighting and CCTV; RongXing will implement badge access and visitor control; RongXing will deploy trained security personnel with human-rights-compliant procedures; RongXing will liaise with police and community leadership; RongXing will record, investigate and close out security incidents.	Daily patrol logs; Monthly review	Construction–Operation	Reduced theft incidents; incident closure rate; functional CCTV coverage	Security Supervisor / Admin Manager	18,000

Socio-economic & Cultural	Resource access	Loss of access to land and natural resources (Negative)	Construction & Operation	RongXing will conduct participatory land-use mapping to identify access routes and resource dependence; RongXing will optimise facility siting within disturbed/industrial areas where feasible; RongXing will maintain or re-route safe access corridors around plant perimeter where practicable; RongXing will provide compensation and livelihood restoration where impacts occur; RongXing will operate an accessible GRM to address complaints promptly.	Quarterly engagement	Construction–Operation	Access arrangements implemented; grievances resolved; livelihood measures delivered	Social Specialist / Community Liaison	15,000
The total cost of the ESMMP									**803,000**

7.4 Action Plan for Incidents and Accidents

Table 28 The action plan for incidents and accidents during both the construction and operational phases of Project.

Category	Phase	Potential Accidents and Incidents	Prevention Measures	Management Actions
Chemical Safety	Construction & Operation	Sulfuric acid spill during storage, transfer, or dosing	Acid-resistant tanks; bunded and lined containment; trained operators; SOPs; routine inspections; availability of neutralising agents	Immediately stop transfer; isolate source; deploy spill kits and neutralising agents; cordon off area; notify HSE Manager; collect contaminated material for approved disposal; report incident and implement corrective actions
Chemical Safety	Construction & Operation	Acid mist or vapour exposure to workers	Enclosed transfer systems; vapour arrestors; local exhaust ventilation; PPE (respirators, goggles); air quality monitoring	Evacuate affected area; provide first aid and medical attention; improve ventilation; review operating procedures; document exposure and retrain personnel
Process Operations	Operation	Pipeline rupture or slurry/solution leakage	Corrosion-resistant pipelines; pressure and flow sensors; routine maintenance; secondary containment	Activate automatic shutdown; isolate pipeline section; contain spill using trenches/sumps; recover material; repair pipeline; conduct root cause analysis
Process Operations	Operation	Process upset leading to tank overflow	PLC/SCADA control systems; level alarms; operator training	Halt inflows; divert solution to emergency containment; stabilise process conditions; inspect instrumentation; update control limits
Fire and Explosion	Construction & Operation	Fire or explosion in SX circuit due to organic solvents	ATEX-rated equipment; grounding; fire detection and suppression systems; hot-work permits	Activate fire alarm; evacuate personnel; deploy firefighting systems; notify emergency services; secure area; conduct incident investigation
Occupational Health & Safety	Construction & Operation	Chemical burns or injuries to workers	PPE enforcement; emergency showers and eyewash stations; safety training	Administer first aid; transport injured worker to clinic/hospital; record incident; review PPE compliance and training gaps
Occupational Health & Safety	Construction & Operation	Slips, trips, and falls	Good housekeeping; clearly marked walkways; adequate lighting	Provide medical assistance; secure hazard area; correct unsafe condition; record and review incident
Air Quality	Construction	Excessive dust	Water spraying; enclosed	Increase dust suppression; suspend activities if

	& Operation	emissions	conveyors; road maintenance; speed limits	required; monitor PM levels; respond to community complaints
Noise & Vibration	Construction & Operation	Excessive noise affecting workers or nearby receptors	Equipment maintenance; acoustic enclosures; PPE; restricted work hours	Adjust work schedules; provide additional noise controls; conduct noise monitoring; engage affected receptors
Water Environment	Construction & Operation	Contaminated runoff entering drainage or Luela Stream	Lined pads; stormwater controls; sediment traps; roofed chemical areas	Block discharge points; divert runoff to containment; sample water; notify authorities if thresholds exceeded; remediate affected areas
Groundwater	Operation	Subsurface contamination from leaks	Monitoring boreholes; lined foundations; secondary containment	Increase groundwater sampling; isolate contamination source; excavate or neutralise affected soils; implement long-term monitoring
Transport & Logistics	Construction & Operation	Traffic accident involving project vehicles	Approved haul routes; trained drivers; speed controls; vehicle maintenance	Secure accident scene; provide emergency response; notify authorities; manage spill if applicable; review transport controls
Electrical Safety	Construction & Operation	Electrocution or electrical fire	Lock-out/tag-out procedures; qualified electricians; insulated equipment	Isolate power supply; provide medical assistance; investigate cause; reinforce electrical safety procedures
Public Safety	Construction & Operation	Unauthorised access, vandalism, or theft	Perimeter fencing; access control; security patrols	Detain trespassers safely; notify security and police; repair damage; strengthen access controls
Environmental	Construction & Operation	Discovery of unexpected contamination	Baseline data; routine monitoring; trained staff	Suspend work in affected area; assess extent; implement remediation; report to management and regulators
Emergency Preparedness	Construction & Operation	Major incident (multiple injuries or environmental release)	Emergency Response Plan; drills; communication protocols	Activate Emergency Response Team; notify emergency services and authorities; evacuate if necessary; conduct post-incident review

7.4.1 Emergency Response Plan

This Emergency Response Plan outlines the procedures to be implemented by RongXing Investments Limited in the event of a pipeline burst or major leakage involving acidic slurry, process solutions, or contaminated water during both construction and operational phases. The objective is to protect human health, prevent environmental contamination, minimise operational downtime, and ensure compliance with regulatory requirements.

a) Immediate Response and Safety Measures

Upon detection or notification of a pipeline burst or major leakage, RongXing will immediately activate emergency response procedures. All personnel in the affected area will be instructed to stop work and move to a safe distance, and access to the area will be restricted to authorised emergency response staff only. Where there is a risk of chemical exposure, appropriate personal protective equipment (PPE), including acid-resistant suits, gloves, respirators, and face shields, will be mandatory.

Automatic or manual emergency shut-off valves will be activated to isolate the affected pipeline section and prevent further release. Electrical power to nearby equipment will be isolated where necessary to eliminate secondary risks.

b) Containment and Control of the Release

RongXing will deploy secondary containment measures immediately to prevent the spread of leaked material. This includes directing flows into engineered containment trenches, sumps, or bunded areas constructed along pipeline routes. Spill kits, absorbent materials, and neutralising agents (such as lime or soda ash) will be applied to stabilise acidic solutions and prevent migration into soil, surface water, or drainage systems.

Where the leak poses a risk to nearby water bodies or drainage channels, temporary barriers or booms will be installed to intercept contaminated runoff and protect downstream environments.

c) Environmental Protection Measures

To safeguard soil and water resources, RongXing will prevent any contaminated material from entering surface water bodies or groundwater pathways. If contamination is suspected, immediate sampling of soil, surface water, or groundwater will be undertaken to assess the extent of impact.

Any contaminated soil will be excavated, neutralised, and temporarily stored in lined and bunded containment areas pending treatment or disposal at a ZEMA-approved facility. Affected areas will be rehabilitated once clean-up activities are completed.

d) Communication and Notification

The incident will be immediately reported internally to the Plant Manager, HSE Manager, and Emergency Response Team. Where required by regulation, ZEMA and other relevant authorities will be notified within the prescribed reporting timeframes.

If the incident has the potential to affect surrounding communities, RongXing will ensure timely communication with local leadership and affected stakeholders, providing clear information on risks, response actions, and protective measures being taken.

e) Repair and Restoration

Once the leak is fully contained and the area declared safe, RongXing will undertake controlled repair or replacement of the damaged pipeline section. Repairs will use corrosion-resistant materials and comply with engineering design standards. Prior to recommissioning, the repaired pipeline will undergo pressure testing and integrity verification to confirm its suitability for safe operation.

f) Incident Investigation and Corrective Actions

RongXing will conduct a formal incident investigation to determine root causes, such as material failure, corrosion, mechanical stress, or operational error. Findings will be documented, and corrective and preventive actions will be implemented, which may include enhanced inspection regimes, design modifications, or additional staff training.

Lessons learned from the incident will be integrated into operational procedures, maintenance schedules, and emergency preparedness training to reduce the likelihood of recurrence.

g) Documentation and Reporting

All actions taken during the emergency response will be fully documented, including timelines, personnel involved, quantities released, clean-up measures, and monitoring results. An incident report will be prepared and submitted to management and regulatory authorities as required, and records will be retained for audit and compliance purposes.

7.5 Resettlement Action Plan (RAP) Framework

To be activated if and when resettlement or livelihood restoration is required under project implementation:

1. Purpose and Scope This Resettlement Action Plan (RAP) Framework provides the structure and procedures Rongxing Investments Limited will follow if any project activities lead to:

- Physical displacement of households or businesses
- Loss of access to land, crops, or other livelihoods
- Economic displacement of informal or customary users

The framework aligns with:

- Zambia's Environmental Management Act No. 12 of 2011
- Land Acquisition Act, Chapter 189
- Zambia Resettlement Policy Framework (2015)
- IFC Performance Standard 5: Land Acquisition & Involuntary Resettlement
- African Development Bank Involuntary Resettlement Policy

2. Resettlement Principles

1. Avoid involuntary resettlement where feasible, or minimize scale.
2. Consult and engage affected persons and communities throughout.
3. Ensure affected persons receive full, timely compensation at replacement value.
4. Restore or improve livelihoods and living standards.
5. Provide special assistance to vulnerable groups.
6. Establish grievance redress mechanisms accessible to all PAPs.

3. Triggers and Screening Before any activity:

- Conduct a land acquisition and resettlement screening.
- Identify potential impacts: permanent/temporary land take, loss of crops, structures, businesses.
- Determine if resettlement or livelihood restoration measures are required.

4. Census and Socio-Economic Studies If screening indicates impacts:

- Carry out a census of Project Affected Persons (PAPs) and inventory of losses.
- Prepare socio-economic baseline to assess vulnerability, income sources, and community structure.

5. Eligibility and Entitlement

- **Eligibility:** Persons with formal legal rights, customary rights, or long-term occupancy; persons who derive a livelihood from land or assets affected before the cut-off date.
- **Entitlements:** Defined in an Entitlement Matrix covering:
  - ✓ Land-for-land or cash compensation at full replacement cost.
  - ✓ Crop and fruit tree compensation plus disturbance allowance.
  - ✓ Business restoration grants for lost income.
  - ✓ Transitional assistance (transport, temporary housing).
  - ✓ Vulnerable group support (elderly, women-headed households, disabled).

6. Valuation and Compensation Methodology

- Replacement cost surveys to establish fair market values.
- Transparent listing and public disclosure of all rates.
- Compensation payments before displacement or restriction of access.

7. Livelihood Restoration and Support

- Agricultural support: seeds, tools, extension services.
- Skills training and vocational programs aligned with local economy.
- Access to micro-credit or grants to restart small businesses.
- Community livelihood restoration programs (e.g., cooperatives).

8. Stakeholder Engagement and Disclosure

- Develop and implement a Stakeholder Engagement Plan (SEP) for resettlement.
- Conduct public meetings, focus groups, and one-on-one consultations.
- Disclose RAP Framework and specific entitlements in local languages.

- Obtain community agreement on cut-off dates and compensation approach.

9. Grievance Redress Mechanism (GRM)

- Establish a multi-tiered GRM: local RAP committee → project management → district authority.
- Register grievances promptly; acknowledge within 5 working days.
- Resolve complaints within 30 days; escalate unresolved cases.
- Maintain grievance log and monitor resolution effectiveness.

10. Institutional Roles and Responsibilities

- **Project Implementation Unit (PIU):** Overall RAP management and coordination.
- **Resettlement Officer:** Day-to-day execution, PAP liaison, compensation delivery.
- **Monitoring & Evaluation (M&E) Team:** Internal quarterly reviews; external annual audit.
- **Stakeholder Committee:** Includes PAP representatives, local authorities, and civil society.

11. Monitoring and Reporting

- **Internal Monitoring:** Track compensation disbursement, livelihood restoration progress, GRM cases.
- **External Evaluation:** Independent audit at mid-term and project completion.
- **Key Indicators:** Number of PAPs compensated, livelihood restoration outcomes, grievance resolution rate.

12. Budgeting and Implementation Schedule

- Establish contingency funds to cover unanticipated impacts.
- Prepare RAP Implementation Plan with timelines:
  - ✓ Screening & census: Months 1–2 (if triggered)
  - ✓ Valuation & compensation: Months 2–4
  - ✓ Livelihood programs: Months 3–12
  - ✓ Monitoring & evaluation: Ongoing

13. Conclusion This RAP Framework ensures that, should resettlement or livelihood losses occur, Rongxing Investments Limited will respond systematically and ethically, restoring affected persons' standards of living and aligning with Zambian law and international best practice

8.0 DECOMMISSIONING AND REHABILITATION PLAN

This Decommissioning and Rehabilitation Plan outlines the measures that RongXing Investments Limited will implement at the end of the project life or upon permanent closure of the facility. The objective is to ensure that the site is left in a safe, stable, and environmentally acceptable condition, with minimal long-term environmental and social risks. The plan covers dismantling of infrastructure, management of residual contamination, rehabilitation of disturbed land, and socio-economic transition considerations.

Table 29 Decommissioning and Rehabilitation Plan

Aspect	Impact	Mitigation / Enhancement Measure	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (ZMW)
Plant and Equipment Removal	Physical hazards, scrap waste, residual contamination	RongXing will safely dismantle all processing equipment, pipelines, tanks, conveyors, and electrical systems; reusable materials will be salvaged, and scrap will be recycled through licensed dealers; hazardous components will be disposed of at approved facilities	Weekly during dismantling	Decommissioning phase	All equipment removed; no abandoned structures; disposal records available	Decommissioning Manager	120,000
Chemical and Reagent Management	Soil and water contamination from residual chemicals	RongXing will drain, neutralise, and flush all chemical tanks, pipelines, and process vessels; residual acids, solvents, and electrolytes will be treated or removed for approved disposal	Per system prior to dismantling	Decommissioning phase	Zero residual chemicals; neutralisation certificates available	HSE Manager / Metallurgist	80,000
Waste Management	Improper disposal of demolition waste	RongXing will segregate demolition waste into hazardous and non-hazardous streams; all wastes will be stored in bunded areas and disposed of through ZEMA-licensed facilities	Weekly	Decommissioning phase	Waste manifests complete; no illegal dumping	Environmental Manager	60,000
Soil Contamination	Long-term soil degradation	RongXing will conduct confirmatory soil sampling in former processing, chemical storage, and pipeline areas; contaminated soils will be	Quarterly	Decommissioning & early rehabilitation	Soil quality meets baseline/standards	Environmental Manager	90,000

		excavated, neutralised, and replaced with clean fill					
Surface Water Protection	Sedimentation or contamination of nearby streams	RongXing will maintain stormwater controls until rehabilitation is complete; sediment traps and diversion drains will remain functional until vegetation is re-established	Monthly	Decommissioning & rehabilitation	No sediment discharge; compliant water results	Environmental Manager	45,000
Groundwater Protection	Residual subsurface contamination	RongXing will continue groundwater monitoring through existing boreholes to confirm no delayed contamination following closure	Quarterly	Post-closure (1–2 years)	Groundwater results within limits	Environmental Manager / Hydrogeologist	70,000
Infrastructure Foundations	Safety hazards and land-use restriction	RongXing will break up concrete foundations to below ground level or remove them entirely, backfill excavations, and compact to stable condition	Monthly	Decommissioning phase	Land surface stable; no open voids	Decommissioning Manager	85,000
Topsoil Restoration	Loss of soil fertility	RongXing will reapply stockpiled topsoil to disturbed areas and improve soil structure using organic amendments where required	Monthly	Rehabilitation phase	Topsoil evenly spread; suitable soil depth achieved	Environmental Manager	55,000
Revegetation	Loss of vegetation and habitat	RongXing will revegetate rehabilitated areas using native grasses, shrubs, and tree species adapted to local conditions; reseeding will be done where establishment is poor	Quarterly	Rehabilitation (1–3 years)	Vegetation cover ≥70%; stable ground	Environmental Manager	65,000
Erosion Control	Long-term soil erosion	RongXing will install erosion control measures such as contouring, rip-rap, and grassed waterways until vegetation is fully established	Quarterly	Rehabilitation	No active erosion; stable slopes	Environmental Manager	40,000
Visual Landscape	Visual scarring of the site	RongXing will contour landforms to blend with surrounding terrain and establish vegetation buffers to restore visual amenity	Semi-annually	Rehabilitation	Site visually acceptable; community acceptance	Environmental Manager / Community Liaison	35,000
Community Safety	Open access and residual hazards	RongXing will remove fencing only after the site is declared safe or, where necessary, maintain	Monthly	Decommissioning & rehabilitation	No safety incidents reported	Security Supervisor	25,000

		barriers and signage to prevent unauthorised access					
Socio-economic Transition	Loss of employment and livelihoods	RongXing will implement workforce transition measures, including advance notice, skills certification, and referral to alternative employment or training opportunities	Once-off with follow-up	Pre-closure & closure	Transition support implemented	HR Manager	30,000
Post-Closure Monitoring	Delayed environmental impacts	RongXing will implement a post-closure environmental monitoring programme covering soil, water, and vegetation for at least 1–2 years	Quarterly	Post-closure	Monitoring reports submitted	Environmental Manager	50,000
Total Estimated Decommissioning and Rehabilitation Cost							**ZMW 850,000**

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10.0 DECLARATION OF AUTHENTICITY OF THE REPORT CONTENTS

10.1 Project Proponent

The Environmental Impact Statement was prepared by Climax Environmental and Technical Services Limited on behalf of Rongxing Investments Limited for submission to the Zambia Environmental Management Agency (ZEMA) in fulfilment of the requirements of the provisions and compliance to the Environmental management Act (EMA) No.12 of 2011 Section 29(1).

I hereby declare the authenticity of this report.

NAME: ……..…..

DESIGNATION: ……...

SIGNITURE: ……

DATE: …… .

10.2 Consultants

Climax Environmental and Technical Services Limited confirms that the information presented herein regarding the Environmental Impact Statement (EIS) for the proposed Expansion of Leach Plants 1 & 2 And Construction of A Copper Ore Processing Plant by Rongxing Investments Limited is correct and complete to the best of our knowledge. We further declare that the conclusions drawn in this report are based on conditions encountered and available information at the time of the assessments.

We therefore disclaim any responsibility to the client (Rongxing Investments Limited) and others in respect of any matters outside the scope of the above.

Name: ……

Designation: ……..

Signature: ……..

11.0 APPENDICES

11.1 CERTIFICATE OF INCORPORATION

Companies Form 7
Companies Registration No. **120160005748**
Serial No. **1025836**

Republic Of Zambia

CERTIFICATE OF INCORPORATION OF COMPANY LIMITED BY SHARES

(Section 10)

This is to certify that RONG XING INVESTMENTS LIMITED is on and from the **16th day of August 2016** incorporated as a COMPANY LIMITED BY SHARES.

Given under my hand and seal at Lusaka, Zambia, this **16th day of August 2016**.

P.C. Mwaba
Assistant Registrar of Companies

0206299

11.2 APPENDIX 2: LAND CONTRACT OF SALE

Dated this day of 2025

ROMARIO NKHATA

TO

RONG XING INVESTMENTS LIMITED

CONTRACT OF SALE

Law Association of Zambia Conditions and Contract of Sale

RELATING TO: PROPOSED SUBDISION A OF SUBDIVISION E OF LOT NO. L/541/M SITUATE IN KALULUSHI DISTRICT OF THE COPPERBELT PROVINCE OF THE REPUBLIC OF ZAMBIA.

Vendor's Advocates:
MESSRS CHISOWA CHAMBERS
Plot No. 6, Munthaka Close, Off Mwatusanga Road,
Woodlands,
Lusaka, Zambia
ADVOCATES AND COMMISSIONERS FOR OATH

Purchaser's Advocates
MESSRS NYIRONGO & CO
No. 21 Kalungwishi Street, 14th Avenue,
Nkana East,
Kitwe, Zambia
ADVOCATES AND COMMISSIONERS FOR OATH

扫描全能王 创建

LAW ASSOCIATION OF ZAMBIA
Contract and Conditions of Sale

THIS AGREEMENT is made the _____ day of _____ Two Thousand and Twenty-Five **BETWEEN: ROMARIO NKHATA,** a Zambian National of Farm 2233, Kamfinsa, Kitwe in the Copperbelt Province of the Republic of Zambia (hereinafter called "the Vendor") of the one part and **RONG XING INVESTMENTS LIMITED,** a company incorporated in Zambia and having its registered office at Kalulushi District of the Copperbelt Province of the Republic of Zambia (hereinafter called "the Purchaser") of the other part.

The Seal for
Director
Secr

WHEREBY IT IS AGREED that the Vendor will sell and the Purchaser will purchase the property referred to in the accompanying particulars (hereinafter referred to as "the Property") at the price of **EIGHT HUNDRED AND SIXTY SIX THOUSAND UNITED STATES OF AMERICA DOLLAR (USD 866, 000.00)** subject to and upon the accompanying terms and conditions expressly declared and adopted herein and the Vendor and the Purchaser do on their respective parts agree to complete the said sale and purchase on the said terms and conditions.

AS WITNESS the hands of the parties have set their hands and seal hereto or their authorized agents the day and year first before written.

SIGNED BY ROMARIO NKHATA)
In the presence of:)

Witness:
Name: MUCHINGA SIMME
ID No.: 203419/10/1
Address: NKana West Flats
Occupation: Lawyer

1

扫描全能王 创建

The Seal for **RONGXING INVESTMENTS LIMITED** was hereunto affixed by

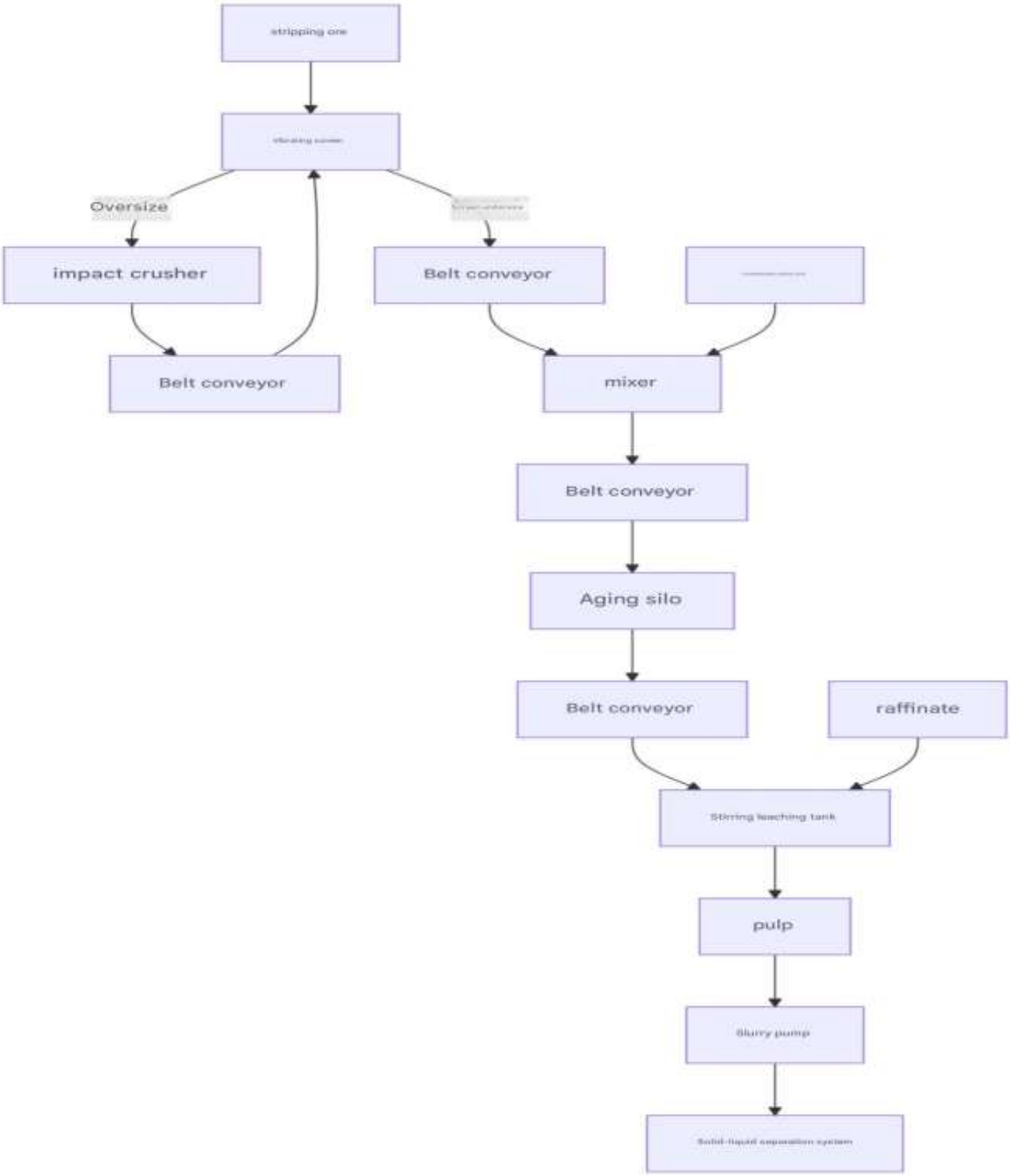
Director: .....

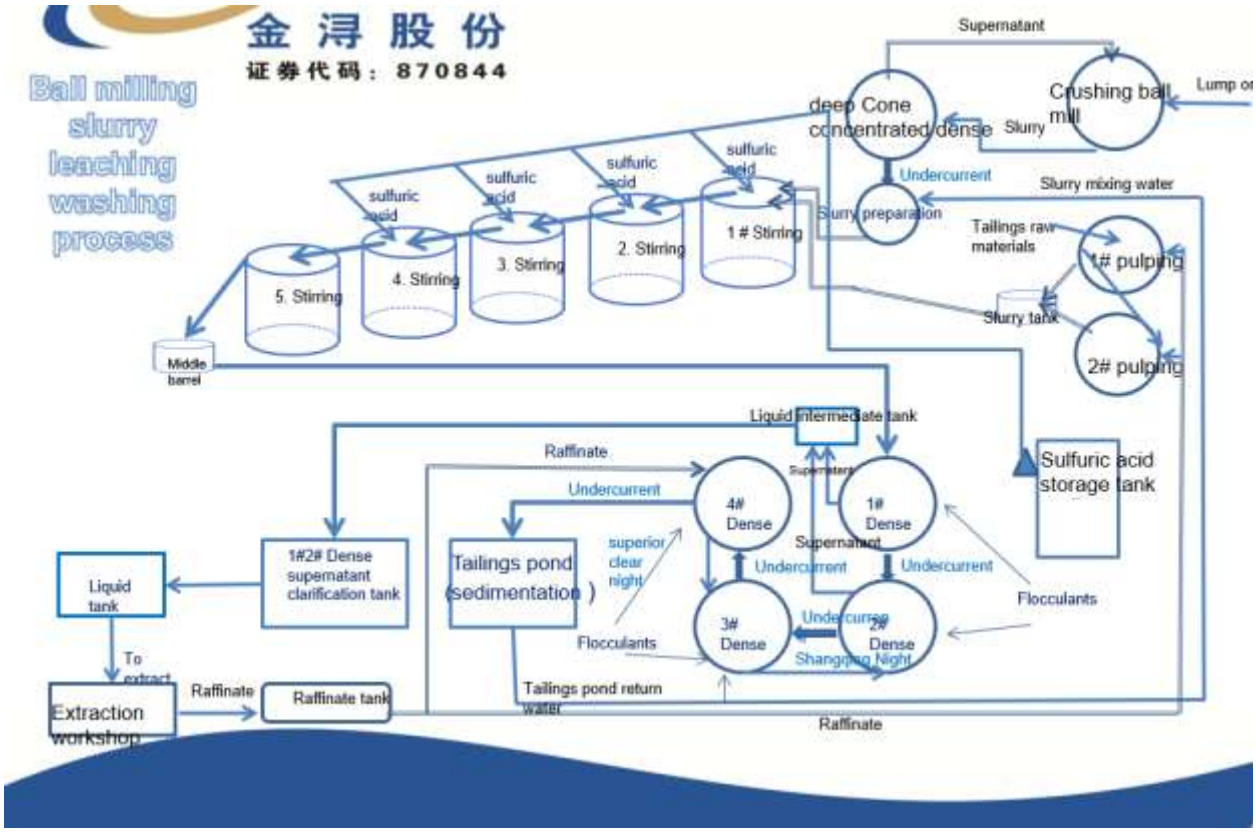
Secretary: .....

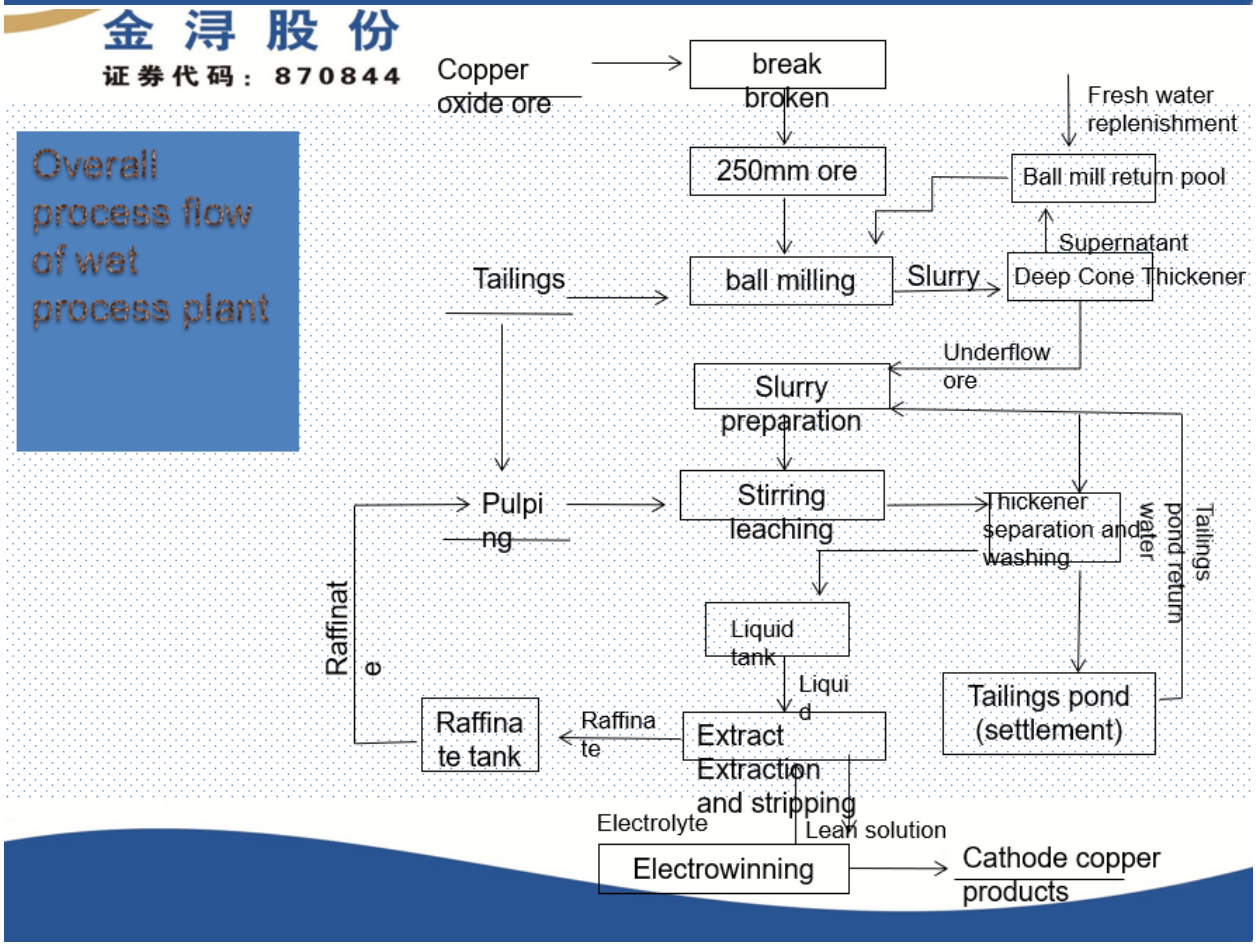
2

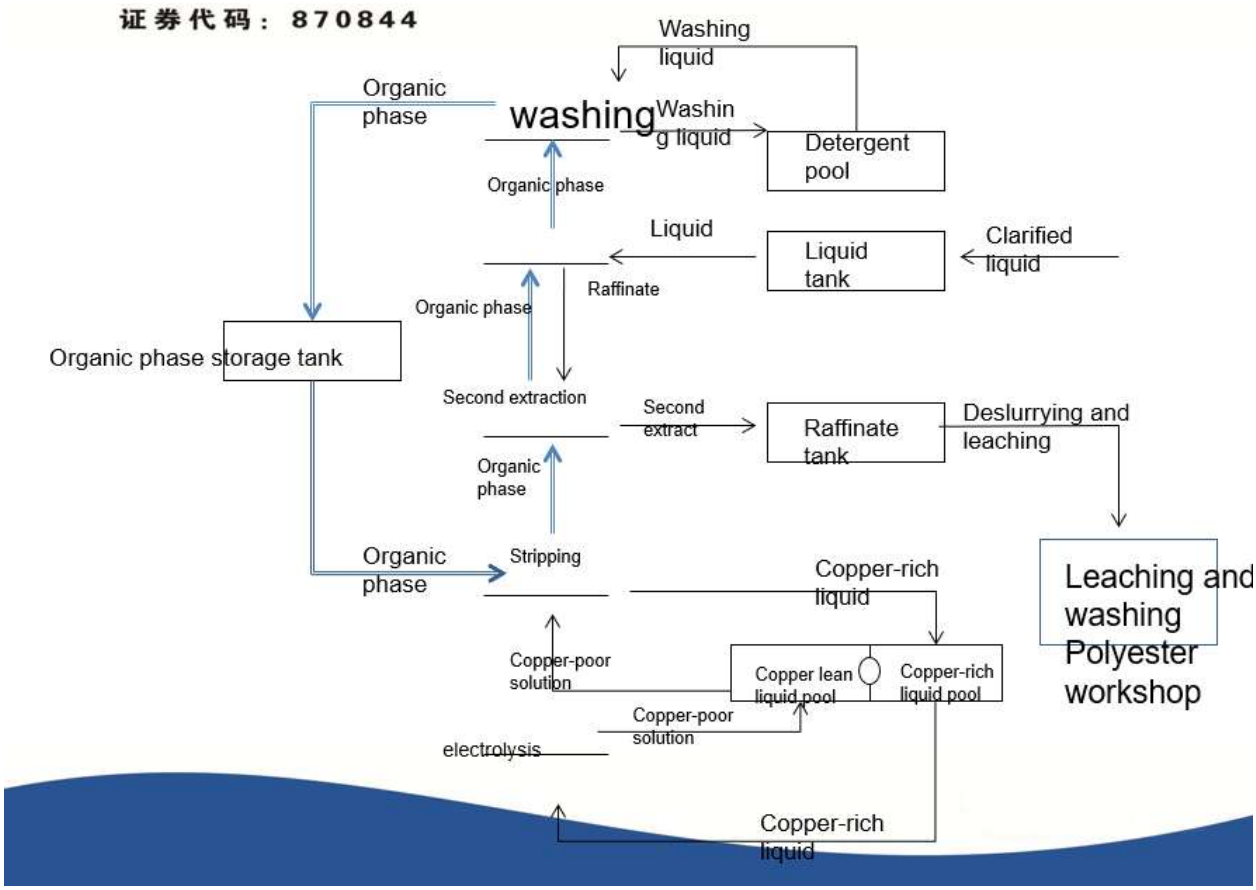
扫描全能王 创建

11.3 APPENDIX 3: CURING SYSTEM PROCESS FLOW CHARTS




金 浔 股 份
证券代码：870844
Ball milling slurry leaching washing process
Supernatant
Crushing ball mill
Lump ore
deep Cone concentrated dense
Slurry
Undercurrent
Slurry mixing water
Slurry preparation
Tailings raw materials
1# pulping
2# pulping
Slurry tank
sulfuric acid
1 # Stirring
2. Stirring
3. Stirring
4. Stirring
5. Stirring
Middle barrel
Liquid intermediate tank
Raffinate
Undercurrent
4# Dense
1# Dense
Supernatant
Sulfuric acid storage tank
Liquid tank
1#2# Dense supernatant clarification tank
Tailings pond (sedimentation)
superior clear night
Undercurrent
Undercurrent
Flocculants
3# Dense
2# Dense
Shangqing Night
Flocculants
To extract
Extraction workshop
Raffinate
Raffinate tank
Tailings pond return water
Raffinate


金 浔 股 份
证券代码：870844
Overall process flow of wet process plant
Copper oxide ore
break broken
250mm ore
Fresh water replenishment
Ball mill return pool
Supernatant
Tailings
ball milling
Slurry
Deep Cone Thickener
Underflow ore
Slurry preparation
Pulping
Stirring leaching
Thickener separation and washing
Tailings pond return water
Raffinate
Liquid tank
Liquid
Raffinate tank
Raffinate
Extract
Extraction and stripping
Tailings pond (settlement)
Electrolyte
Lean solution
Electrowinning
Cathode copper products


证券代码： 870844
Washing liquid
Organic phase
washing
Washing liquid
Detergent pool
Organic phase
Liquid
Liquid tank
Clarified liquid
Raffinate
Organic phase
Organic phase storage tank
Second extraction
Second extract
Raffinate tank
Deslurrying and leaching
Organic phase
Organic phase
Stripping
Copper-rich liquid
Leaching and washing Polyester workshop
Copper-poor solution
Copper lean liquid pool
Copper-rich liquid pool
Copper-poor solution
electrolysis
Copper-rich liquid

11.4 APPENDIX 4: MINUTES OF THE SCOPING MEETING

SCOPING MEETING MINUTES FOR THE PROPOSED RENOVATION AND EXPANSION PROJECT OF LEACH PLANTS 1 & 2 AND CONSTRUCTION OF A COPPER ORE PROCESSING PLANT

Project Proponent: RongXing Investments Limited

Project Title: Expansion and Technical Renovation of Copper Processing Facilities

Location: Chambishi Area, Kalulushi District, Copperbelt Province

Venue: Luela Primary School

Date: 30/12/2026

Meeting Start Time: 11:23 Hours

Meeting End Time: 13:37 Hours

1.0 Introduction

A public scoping meeting was held at Luela Primary School as part of the Environmental Impact Assessment (EIA) process for the proposed Expansion and Technical Renovation Project by RongXing Investments Limited. The purpose of the meeting was to inform stakeholders and affected communities about the proposed project, its location, scope, anticipated environmental and social impacts, and to obtain views, concerns, and recommendations from the public and key stakeholders in accordance with the Environmental Management Act and ZEMA EIA Regulations.

2.0 Opening of the Meeting

The meeting commenced at 11:23 hours with an opening prayer offered by a community volunteer. This was followed by welcoming remarks and confirmation of the meeting agenda.

3.0 Introduction of Attendees

The meeting was attended by representatives from RongXing Investments Limited, government officials, local leadership, and members of the community. Introductions were made as follows:

Company Representatives (RongXing Investments Limited):

- Madam Vasa
- Mr. Songwe

Government and Civic Leadership:

- The Mayor of Kalulushi District
- The District Commissioner
- The Councillor
- The Mayor's Assistant

Community Representatives:

- Ward Development Committee (WDC) members
- Traditional and community leaders
- Local residents

Consultants – Climax Environmental and Technical Services Limited:

- ✓ Eng. Kelvin Mwansa – Director and Lead Presenter
- ✓ Eng. Chibwe Musonda – Operations Engineer
- ✓ Eng. Titus Mulenga – Operations Engineer

Members of the local community, group leaders, and interested stakeholders were also present.

4.0 Presentation Overview

The presentation was delivered by Eng. Kelvin Mwansa on behalf of the consultant and covered the following key areas:

4.1 Project Location

The proposed project site plot 19 is located on Subdivision A of Subdivision E of Lot No. L/541/M within the Chambishi area of Kalulushi District, Copperbelt Province. The site is approximately 4 km north of the Kitwe–Chingola Sabina Road junction and 2.07 km north-west of the Kitwe–Mufulira Road, providing efficient access to major transport routes.

4.2 Project Description

The project involves the expansion and technical renovation of existing hydrometallurgical copper processing operations, including Leach Plant 1 and Leach Plant 2, and the construction of a new 4,000 tonnes per day raw material preparation and acid curing facility on Plot 19.

Key components include:

- Crushing, wet screening, agglomeration, and controlled acid curing of low-grade tailings and high-bonded oxide ores.
- Installation of a high-capacity thickener for slurry washing and recovery of pregnant leach solution.
- Expansion and reconfiguration of solvent extraction (SX) circuits.
- Expansion of electrowinning (EW) capacity through additional cells and upgraded rectifiers.

- Implementation of closed-loop water recycling systems to minimize freshwater abstraction.

The presenters emphasized that all developments will occur within land legally owned by RongXing Investments Limited and no relocation of people will be required.

4.3 Anticipated Impacts and Mitigation Measures

The consultant outlined potential positive impacts such as employment creation, improved copper recovery from tailings, and local economic development. Potential negative impacts discussed included tailings dam risks, water contamination, chemical spills, dust generation, traffic impacts, and occupational health and safety risks.

Mitigation measures highlighted included:

- Construction of cofferdams and routine dam integrity inspections.
- Weekly water quality monitoring.
- Bunded chemical storage and spill response systems.
- Dust suppression and traffic management measures.
- Strict occupational health and safety controls and emergency preparedness.

5.0 Questions, Concerns, and Responses

Mr. Moses Ng'andwe (Chairman)

Question: What measures has the company put in place to ensure that the surrounding community is protected from environmental impacts, particularly in the event of a tailings dam failure?

Response (Madam Vasa – RongXing Investments Limited):

Madam Vasa explained that tailings and process water management is a critical priority for the company. To address the risk of dam failure, RongXing has constructed a cofferdam downstream of the main containment facility, which acts as a secondary barrier to contain any potential release of tailings or contaminated water.

In addition, the company has implemented a tailings dam integrity inspection programme, which includes routine visual inspections and periodic technical assessments by qualified personnel. The Safety and Environmental Departments jointly oversee these inspections to ensure early identification of any structural or operational weaknesses.

She further stated that weekly surface and groundwater quality monitoring is already in place to detect any changes in water quality. Monitoring results are reviewed internally and submitted to regulatory authorities as required. Emergency response procedures are also established to ensure rapid action in the unlikely event of a failure, with clear communication protocols involving local authorities and emergency services.

Ms. Gina Zulu

Question: What are the boundaries of the proposed project site, and is the company planning to extend operations beyond the approved area?

Response (Mr. Songwe – RongXing Investments Limited):

Mr. Songwe clarified that the project is confined to Subdivision A of Subdivision E of Lot No. L/541/M, including Plot 19, all of which is legally owned by RongXing Investments Limited. He explained the site layout using the approved subdivision plan, clearly indicating where the new curing plant and associated infrastructure will be constructed.

He emphasized that the expansion will not extend beyond the legally acquired land, and no additional land acquisition is planned. Furthermore, the land earmarked for expansion is currently vacant and unoccupied, meaning there will be no relocation or displacement of households or livelihoods as a result of the project.

Ms. Mwenya

Question: What is the expected lifespan of the proposed project?

Response (Madam Vasa):

Madam Vasa stated that the anticipated operational lifespan of the project is approximately ten (10) years from the commencement of full-scale operations. She explained that this estimate is based on available tailings and overburden resources, as well as projected processing capacities. She added that continued compliance, maintenance, and potential future optimization could further support sustainable operations within this timeframe.

Mr. Pephias Chishimba

Concern: The company should prioritize employment for local people rather than bringing workers from far away, and CSR initiatives should benefit communities both before and across the stream.

Response (Mr. Songwe):

Mr. Songwe acknowledged the concern and confirmed that local employment is a key priority for RongXing Investments Limited. He explained that recruitment processes are conducted in collaboration with local leadership structures, including the Ward Development Committee (WDC), to ensure fairness and transparency. Community members seeking employment are encouraged to formally register their names through these structures.

Regarding CSR, he noted that RongXing is committed to inclusive community development. CSR planning will consider all affected communities, including those located upstream and downstream of the project area, and will be guided by identified community needs communicated through recognized leadership channels.

Ms. Carol

Question: What additional Corporate Social Responsibility (CSR) projects is the company planning for the local community?

Response (District Commissioner):

The District Commissioner explained that effective CSR implementation requires structured engagement. He advised that communities should clearly articulate their priority needs through established leadership structures such as the WDC and local council offices. These needs can then be formally presented to the company.

He further stated that while the company will consider community inputs, final decisions on CSR projects rest with RongXing Investments Limited, based on feasibility, sustainability, and alignment with broader development objectives.

Ms. Glender (WDC Representative)

Question: What measures are in place to manage chemical spillages, should they occur?

Response (Mr. Songwe):

Mr. Songwe explained that RongXing has developed and implemented a Chemical and Hazardous Materials Management System. All chemicals, including sulfuric acid and reagents, are stored in bunded and impermeable containment areas designed to prevent leaks and soil contamination.

The plant is equipped with spill kits at strategic locations, and workers are trained in spill prevention, immediate containment, cleanup procedures, and incident reporting. He added that the company has experienced similar incidents in the past and has used those experiences to strengthen its response capacity, ensuring that any future incidents can be effectively managed with minimal environmental or community impact.

Mr. Mulenga Sephalino

Concern: The condition of the Mufulira Road and bridge section used by the company is poor, and dust from company traffic is affecting roadside traders and school children.

Response (Mr. Songwe and Madam Vasa):

Mr. Songwe acknowledged the concern and explained that the company previously conducted dust suppression activities along the affected road sections. However, following complaints from some community members who suspected that acid-contaminated water was being used, the company decided to halt the activity to avoid further misunderstandings.

Madam Vasa added that RongXing has since formally engaged the Road Development Agency (RDA) and submitted an application to obtain approval to rehabilitate and improve the affected road sections. Due to the onset of the rainy season, road works are expected to commence after the rains, once conditions are suitable. In the interim, the company will continue to assess alternative dust control and traffic management measures.

Mr. Joseph Chishimba

Concern: Employment challenges are often linked to failures by local leadership, and corruption should not be tolerated. He also questioned whether agreed mitigation measures are followed up and implemented.

Response (Mr Songwe):

Mr Songwe acknowledged the concern and stated that RongXing relies on structured engagement with local leadership, but also maintains internal controls to promote transparency and accountability. Recruitment processes are documented, and the company encourages community oversight through recognized leadership channels.

Regarding follow-up on mitigation measures, he explained that the company has internal monitoring systems, regular environmental audits, and routine inspections by government regulators. These mechanisms ensure that commitments made during consultations are translated into actual actions on the ground and that any gaps are identified and corrected promptly.

Mrs. Ruth M. (Environmental Planner – Kalulushi District)

Concern: Leaching is a high-risk process that can cause serious environmental damage if poorly managed. She also raised concerns that inspectors are sometimes denied access to the plant.

Response (Mayor and Madam Vasa):

The Mayor emphasized that inspectors are legally mandated to access the facility and that denying access is unacceptable. Inspections are conducted for the benefit of both the company and the surrounding community.

Madam Vasa confirmed that RongXing recognizes its responsibility to grant inspectors and government officials full access at all times. She clarified that past challenges were largely due to communication gaps with security personnel. To resolve this, management will provide direct contact details and formal access protocols to ensure inspectors are granted immediate access upon arrival.

Mr. Edward S

Suggestion: The company should consider constructing a health facility as part of its CSR programme.

Response (Councillor):

The Councillor explained that RongXing had previously requested the community to agree on a suitable location for a health post. However, delays have occurred due to community indecision regarding the preferred site. He encouraged the community to reach consensus so that the project can move forward.

6.0 Closing Remarks

Mayor of Kalulushi District:

The mayor thanked participants for constructive engagement and emphasized the importance of compliance, transparency, and continued community engagement.

District Commissioner:

The District Commissioner reaffirmed government support for responsible investment and urged continued collaboration between the company, regulators, and the community.

7.0 Closure of the Meeting

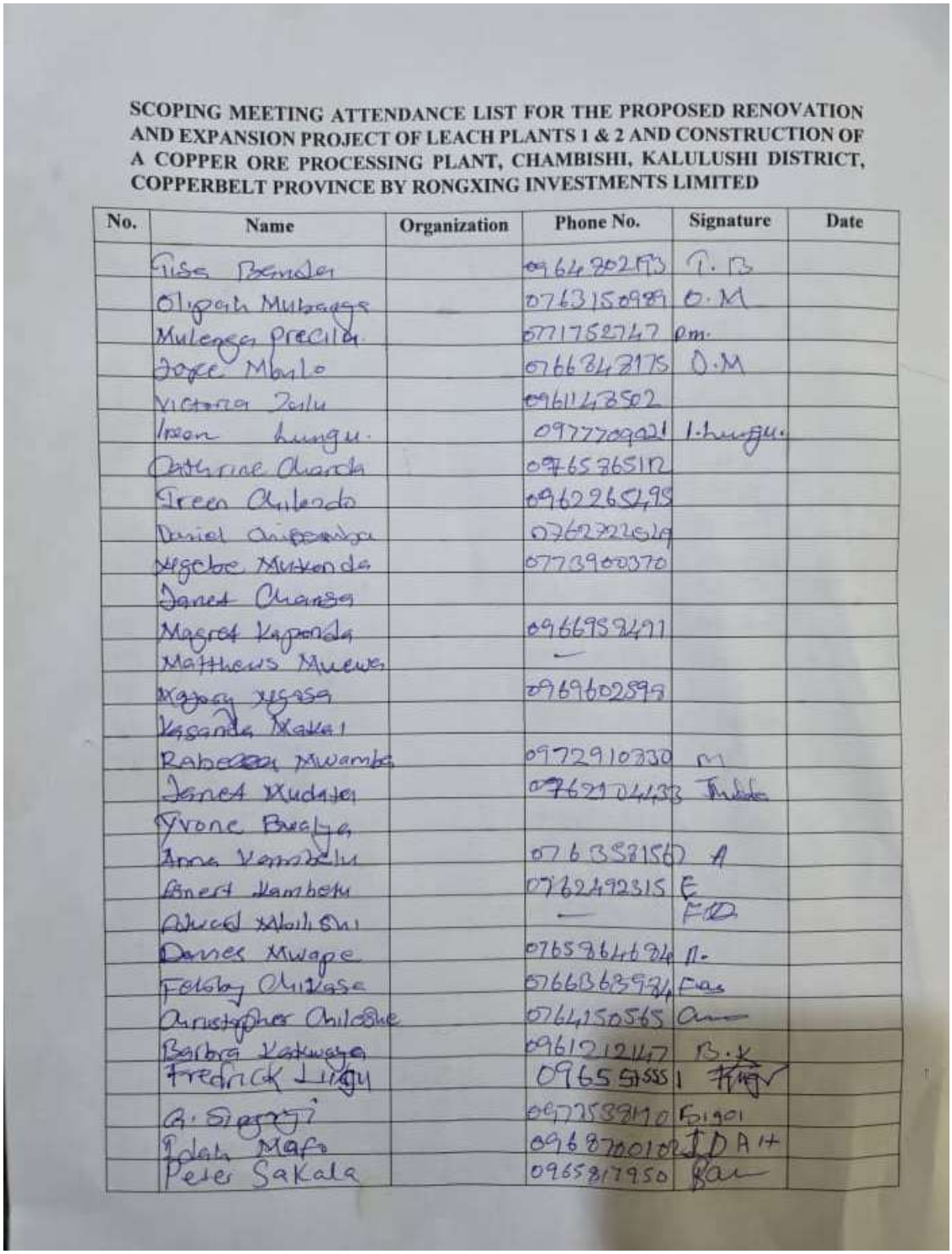
The meeting concluded with the singing of the National Anthem, followed by a closing prayer. The meeting officially ended at 13:37 hours.

Prepared by:

Eng. Chibwe Musonda - Climax Environmental and Technical Services Limited

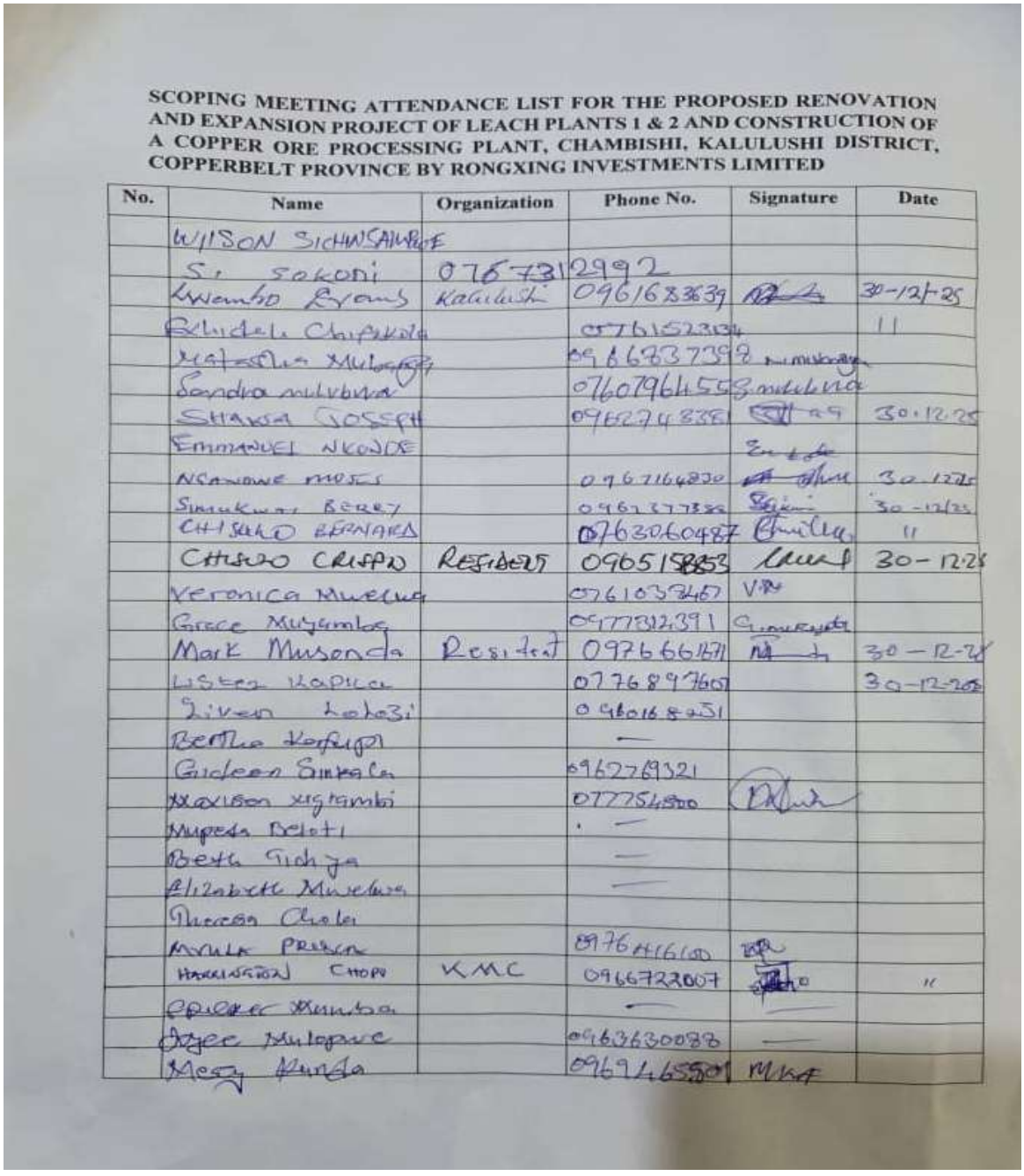
Sign:

11.5 APPENDIX 5: SIGNED LIST OF ATTENDEES



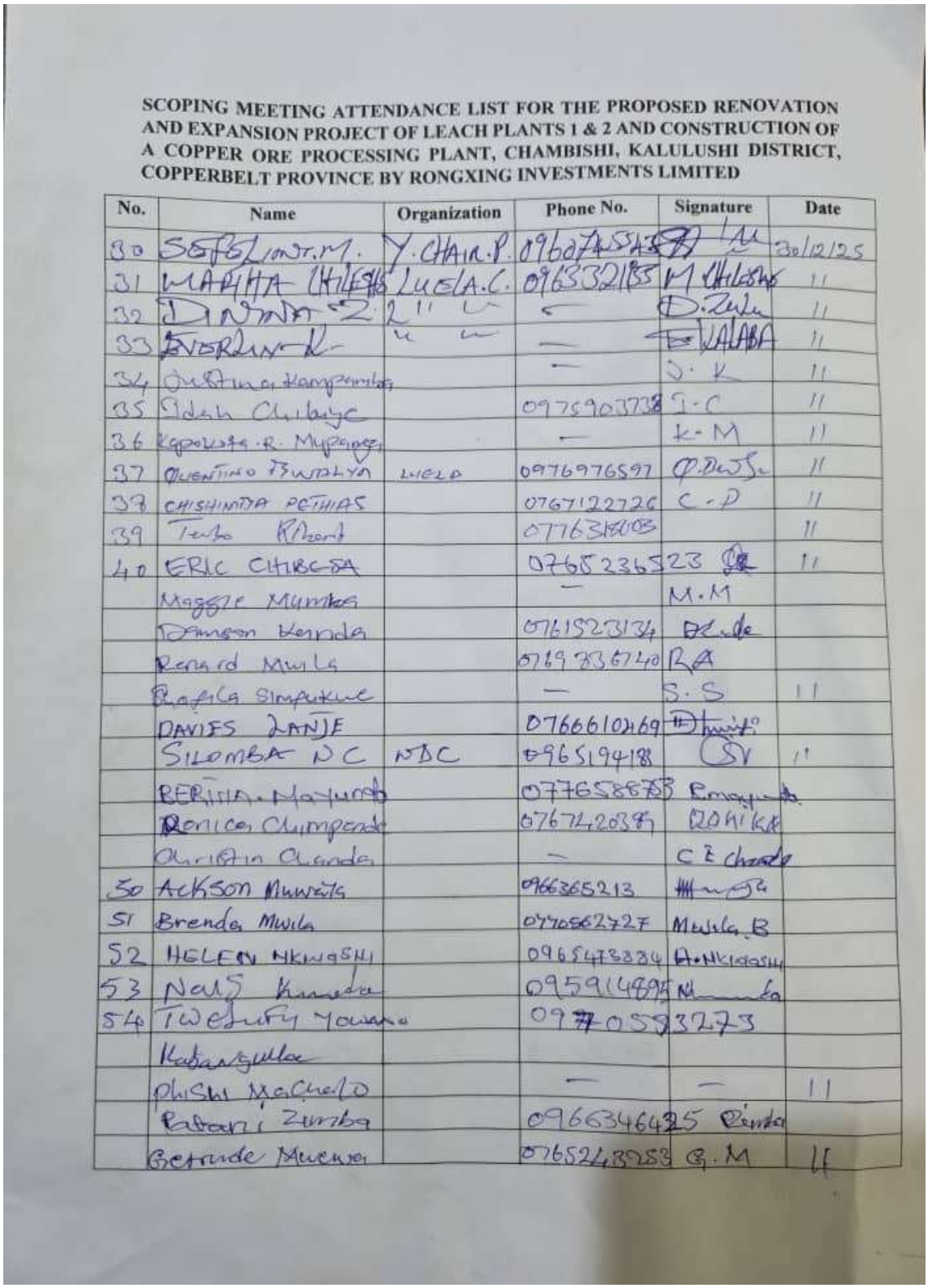
SCOPING MEETING ATTENDANCE LIST FOR THE PROPOSED RENOVATION AND EXPANSION PROJECT OF LEACH PLANTS 1 & 2 AND CONSTRUCTION OF A COPPER ORE PROCESSING PLANT, CHAMBISHI, KALULUSHI DISTRICT, COPPERBELT PROVINCE BY RONGXING INVESTMENTS LIMITED

No.	Name	Organization	Phone No.	Signature	Date
	Tisa Bemba		0964802453	T. B	
	Oliseth Mulenga		0763150989	O. M	
	Mulenga Precila		0771752747	pm.	
	Joyce Mbulo		0766842175	O.M	
	Victoria Zulu		0961143502		
	Ireen Lungu.		0977709921	I. Lungu.	
	Catherine Chanda		0976576512		
	Ireen Chileshe		0962265498		
	Daniel Chipeshe		0762726169		
	Ngabe Mukonde		0773900370		
	Janet Chanda				
	Magret Kapanda		0966959471		
	Matthews Mwewa		—		
	Ngoza Ngosa		0969602599		
	Kasanda Kakai				
	Rebecca Mwamba		0972910330	M	
	Janet Mudaba		0762104433	Mudaba	
	Yvone Bwalya				
	Anna Kambole		0763581560	A	
	Ernest Kambole		0762492315	E	
	Alfred Mailoshi		—	FAD	
	Dames Mwape		0765864624	M.	
	Felsby Chikasa		0766363934	Fas	
	Christopher Chileshe		0764150565	Ch	
	Barbra Katwaya		0961212447	B.K	
	Fredrick Lungu		0965555551		
	A. Siyanga		0977589170	Fsiyan	
	Idah Mafa		0968700102	IDA M	
	Peter Sakala		0965817950		



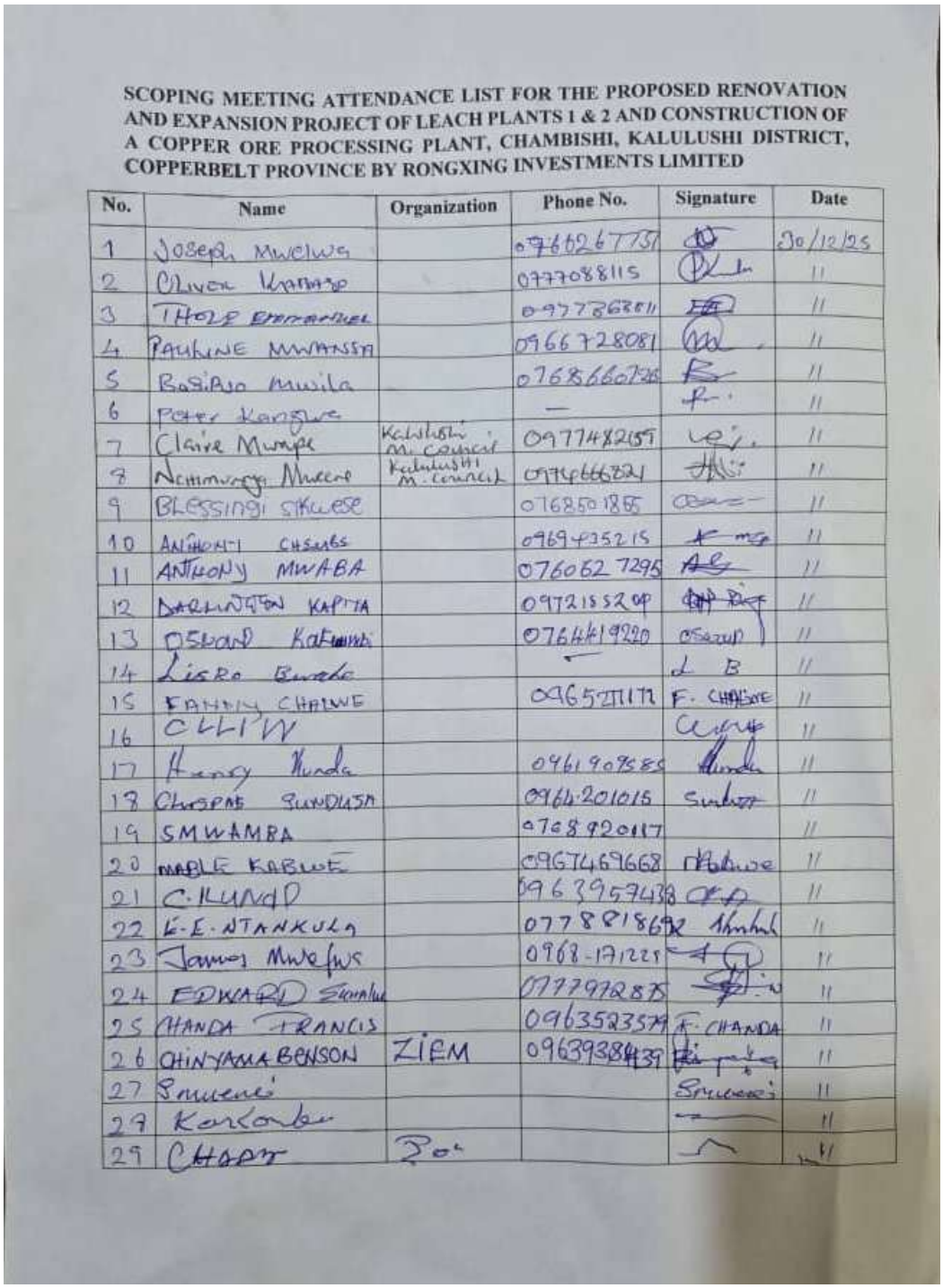
SCOPING MEETING ATTENDANCE LIST FOR THE PROPOSED RENOVATION AND EXPANSION PROJECT OF LEACH PLANTS 1 & 2 AND CONSTRUCTION OF A COPPER ORE PROCESSING PLANT, CHAMBISHI, KALULUSHI DISTRICT, COPPERBELT PROVINCE BY RONGXING INVESTMENTS LIMITED

No.	Name	Organization	Phone No.	Signature	Date
	WILSON SICHWSAMBE				
	S. SOKONI		0767312992		
	Lwambo Evans	Kalulushi	0961683639		30-12-25
	Chidele Chipakala		0761523134		11
	Mathews Mulenga		0966837398		
	Sandra mulubwa		0760796455		
	SHAKA JOSEPH		0962743381		30.12.25
	EMMANUEL NKONDE				
	NCANOWE MOSES		0967164830		30.12.25
	Simukwai BEREY		0962377358		30-12-25
	CHISEKO BERNARD		0763060487		11
	CHISEKO CRISPIN	RESIDENT	0965158853		30-12-25
	Veronica Mwelwa		0761039467		
	Grace Mujumba		0977312391		
	Mark Musonda	Resident	0976661471		30-12-25
	Listen Kapilca		0776897607		30-12-25
	Given Lubezi		0961685231		
	Bertha Kafuli		—		
	Gideon Simfukwe		0962769321		
	Maxwell Mgtambi		0777545300		
	Mupeta Doloti		—		
	Beth Tichya		—		
	Elizabeth Mwelwa		—		
	Theresa Chole				
	MWILA PRISCA		0976416100		
	HARRINGTON CHOPA	KMC	0966722007		11
	Esther Mumba		—		
	Joyce Mulopwe		0963630088	—	
	Mary Mwila		0961465501	MWF	



SCOPING MEETING ATTENDANCE LIST FOR THE PROPOSED RENOVATION AND EXPANSION PROJECT OF LEACH PLANTS 1 & 2 AND CONSTRUCTION OF A COPPER ORE PROCESSING PLANT, CHAMBISHI, KALULUSHI DISTRICT, COPPERBELT PROVINCE BY RONGXING INVESTMENTS LIMITED

No.	Name	Organization	Phone No.	Signature	Date
30	SEPO MR. M.	Y. CHAIR. P.	0960		30/12/25
31	MARTHA CHILESHE	LUELA.C.	0963321855	M CHILESHE	11
32	DINNAH 2	2 11	"	D. Zulu	11
33	EVERLINE K	" "	—	KALABA	11
34	Justina Kampemba		—	J. K	11
35	Idah Chibuye		0975903738	I. C	11
36	Kapolota R. Mupanga		—	K. M	11
37	QUENTINO MWALYA	LUELA	0976976597	Q. Mwa	11
38	CHISHINDA PETHIAS		0767122726	C. P	11
39	Tembo Richard		0776315005		11
40	ERIC CHIBESA		0768236523		11
	Maggie Mumba		—	M. M	
	Dameon Kenda		0761523134		
	Renard Mwila		0769736740	RA	
	Bwalya Simpukwe		—	S. S	11
	DAVIES ZANJE		0766610469		
	SILOMBA N C	NDC	0965194188	SV	11
	BERISHA Mayumb		0776588		
	Monica Chimpende		0767426387		
	Christin Chanda		—	C Chanda	
50	ACKSON Muwata		0966365213		
51	Brenda Mwila		0770562727	Mwila B	
52	HELEN NKWASHI		0965473334	H. Nkwashi	
53	Nancy Kunda		0959148		
54	Twebuffy Yowa		0977059 3273		
	Kabangulla				
	Phiri MacDonald		—	—	11
	Patrick Zimba		0966346435		
	Getrude Mwewa		0765243253	G. M	11



SCOPING MEETING ATTENDANCE LIST FOR THE PROPOSED RENOVATION AND EXPANSION PROJECT OF LEACH PLANTS 1 & 2 AND CONSTRUCTION OF A COPPER ORE PROCESSING PLANT, CHAMBISHI, KALULUSHI DISTRICT, COPPERBELT PROVINCE BY RONGXING INVESTMENTS LIMITED

No.	Name	Organization	Phone No.	Signature	Date
1	Joseph Mwelwa		0976026775		30/12/25
2	Oliver Kamaso		0977088115		"
3	THOLE Emmanuel		0977263611		"
4	PAULINE MWANSSA		0966728081		"
5	Basilio Mwila		0768660736		"
6	Peter Kangwa		—		"
7	Claire Mwape	Kalulushi M. Council	0977482659		"
8	Nchimunya Mwene	Kalulushi M. Council	0976666824		"
9	BLESSINGS SIKWESE		0768501855		"
10	ANTHONY CHISABA		0969435215		"
11	ANTHONY MWABA		0760627295		"
12	DARLINGTON KAPITA		0972155209		"
13	OSWALD KAFUMBA		0764419220		"
14	Lisa Banda				"
15	FANNY CHALWE		0965211172		"
16	CLIVE				"
17	Henry Kunda		0961907585		"
18	Chisepo Sundasa		0966201015		"
19	SMWAMBA		0768920117		"
20	MABLE KABWE		0967469668		"
21	C. ILUNGA		0963957438		"
22	E-E-NTANKULA		0778818692		"
23	James Mwelwa		0968-171225		"
24	EDWARD Sinyinda		0777972857		"
25	CHANDA FRANCIS		0963523357	F. CHANDA	"
26	CHINYAMA BENSON	ZIEM	0963938439		"
27	Simuenè			Simuenè	"
28	Kankonka				"
29	CHOPE	Zoo			"

11.6 APPENDIX 6: PICTURES OF STAKEHOLDERS DURING THE MEETING

11.7 APPENDIX 7: INVITATION LETTER FOR THE SCOPING MEETING

11.8 APPENDIX 8: MEDIA ADVERT FOR THE SCOPING MEETING

the year, unwrapping our re

advantage of the option for signing a TPA with ZRA for a flexible tax payment plan.

Once a TPA is granted, the taxpayer will have access to a temporary TCC for a specified period. Taxpayers seeking relief through a TPA must submit all tax returns, write an application letter to ZRA through the Director Enforcement, provide bank statements for the last three months, make a down payment of 30 percent of the outstanding tax debt and provide any other documentation as may be required.

Taxpayers are encouraged to take a proactive approach to tax compliance as ZRA positions to achieve on the one hundred and eighty-five billion (K185bn) tax revenue contribution towards the 2026 national budget.

ZRA is resolved to support growth of businesses in the country while at the same time ensuring sustainable and enhanced tax revenue collection.

May this festive season bring peace, laughter, renewed hope and meaningful time to all taxpayers.

Compliments of the season and Merry Christmas!

For feedback, please write to: ZRAESSAY@zra.org.zm

INVITATION TO A PUBLIC SCOPING MEETING

Climax Environmental and Technical Services Limited wishes to invite members of the general public to a scoping meeting for the proposed Plant Expansion Project by Rongxing Investment Limited.

The scoping meeting will be held as follows:
- Date: 30th December 2025
- Time: 10:00 hours – 12:00 hours
- Venue: Luela Primary School

All interested and affected parties are strongly encouraged to attend this important meeting, which forms part of the ongoing Environmental Impact Assessment (EIA) process.

For further information, please contact:
Engineer Mwansa
0966 122 943
climaxenvironmental@gmail.com

RSO400931/25.12

11.9 APPENDIX 9: SIGNED CVs OF THE PROPOSED EIA TEAM

CURRICULUM VITAE

Personal Data

Surname: Mwansa **First name:** Kelvin Chibwe
Sex: Male **Nationality:** Zambian

NRC: 304819/32/1 **Date of birth:** 14/06/1994

Marital status: Single **Religion:** Christian

Cell: +260966122943/+260979844419

Email: mwansakchibwe@gmail.com

Residential Address: House #1084 Ndeke, Kitwe, Zambia.

Work Experience

October, 2021 – November, 2024 **Climax Environmental & Technical Services Ltd**

Position: Director

Areas of Expertise:

- Pollution control, water quality assessment and management, stack emissions sampling and chemicals and solid waste management
- Environmental auditing for clients.
- ISO 14001 Environmental Management Systems
- Water and effluent sampling and monitoring
- Ventilation monitoring
- Waste management

12th January, 2020 – October, 2022 **Blueprint Environmental and Construction Ltd**

Position: Operations Engineer.

Areas of Expertise:

- Pollution control, water quality assessment and management, stack emissions sampling and chemicals and solid waste management
- Conduction of Environmental and Social Impact Assessment (ESIA), preparation of the Environmental and Social Impact Statement and its associated Environmental and Social Management Plan (ESMP).
- Environmental auditing for clients.
- Management of all construction projects for clients.
- ISO 14001 Environmental Management Systems

11th September – 28th Nov, 2018. **Chambishi Copper Smelter (CCS) 2018:**
Position: Trainee Safety Engineer
Duties:

- Conducting safety and Environmental inspections and audit
- Safety and environmental orientation to old and new workers.
- Effluent analysis and management
- Surface and ground water testing

9th July 2017- 20th August 2017: **Vital Beverages Ltd.**

Position: process engineer trainee.

Duties:

- Chemical and physical analysis processed water.
- Water treatment process monitoring.
- Safety inspections and auditing

March 2016- July 2016: **Mansa municipal council**
Position: Environmental planner

Duties:

- Road construction inspections
- Rural and urban water projects supervision
- Inspections of all Water, Sanitation and Hygiene (WASH) projects under Mansa Municipal Council

Luapula Water Supply and Sanitation Company
Position: Meter reader

Duties:

- Water meter reading
- Delivering water bills to customers.

Education Background

Tertiary Education **The Copperbelt University**

2014-2019: Bachelor of Engineering degree in Environmental Engineering at the Copperbelt University.

Secondary Education
2008-2012: **St Clement Secondary School**
GCE'O' LEVEL Certificate.

Achievements and Awards

- Dissertation on, Mapping quality of ambient air, using geographical information system (GIS) a case study of Chambishi township in Kalulushi district.
- Bachelor of Engineering in Environmental Engineering at the Copperbelt University.
- Served as a mayor under the Copperbelt University Student Union (COBUSU) 2018.

Skills and Abilities

- Very good communication, analytical, organizational and interpersonal skills;
- Working knowledge of Environmental Management systems (ISO 14001)
- Analytical and conceptual thinking using logic and reason, creative and strategic thinking.
- Strong attention to detail with strong and judgement capabilities to anticipate issues and provide solution.
- Self-motivated person who is able to co-operate on site and everywhere;
- Computer literate and conversant in the use of various application packages (MS Word, PowerPoint, Excel and GIS)
- Ability to make independent and informed decisions individually.
- Can work independently or with minimum supervision; and
- Very effective team player who relates well with others on different level.

Hobbies

- Reading
- Social interaction
- Playing soccer
- Watching football.

References

1. Mr Chilenga Mwansa
Operations Manager, Blueprint Environmental and Construction Ltd.
+260973560515

2. Mr. J. Kanta
Director, Engineering department
Mansa municipal council.
+26096716080

3. Zomoya Tambuzi
Programs Officer
World Food Program (WFP)
+260971670300

CERTIFICATION

I, Kelvin Mwansa, certify that to the best of my knowledge and belief, this information correctly describes myself, my qualification and my experience.

Sign.....

CURRICULUM VITAE

PERSONAL DETAILS

Name:	MPUNDU CHARLES CHILUMBA MULENGA
Date of Birth:	3rd December, 1995
Sex:	Male
NRC No:	305268/31/1
Marital Status:	Single
Citizenship:	Zambian
Residential Address:	House No. 4, Chandamali Avenue-Kitwe
Contact No:	+260 761-542-110/ 260 953345073
Email:	charleschilumbamulenga777@gmail.com

WORK EXPERIENCE AND TRAINING

Environmental Officer, Climax Environmental and Technical Services Ltd **2022-Present**

Environmental works carried out:

EIA Work:

- Preparation and execution of Environmental and Social Impact Assessment (ESIA)
- Preparation of the Environmental and Social Impact Statement
- Formulating and implementation of Environmental and Social Impact management plan
- Environmental and Social sampling of mine area to assess socio-economic health of mine projects

Ecological Work:

- Preparation and execution of fauna and flora, *in-situ* and *ex-situ*, conservation plan and policy
- Ecological count and recording to ascertain quantity and quality of an ecology
- Conducting of environmental sensitization and awareness campaigns to communities
- Creating and executing waste management plans and policies for ecological sustainability
- Rejuvenation and replenishing projects to retain ecological diversity and quality
- Assessing and advising on eco-friendly procurement standards

Copperbelt Marketing and Admissions Officer **2019 to 2022**

Cavendish University Zambia

Marketing Work:

- Preparation and execution of corporate and individual marketing outreach programs
- Providing career guidance to prospecting clients

- Creating and executing feedback programs for existing students to improve service delivery and create indirect advertisement

Admission Work

- Creating and executing program and career awareness orientation systems for new clients
- Selection and admission of successful candidates into preferred programs
- Organizing venues for examinations and other school related events for Distance learning students
- Advising on alternative payment plans for students to cover their fees on time

Student Industrial Attachment Program **June to August 2017**

Tropical Diseases Research Center, Ndola Central Hospital-Ndola

Laboratory Bio-work

- Executing HIV tests using the SD bio line test and enzyme-linked immunosorbent assays (ELISA)
- Carried out test for syphilis using the Rapid Plasma Reagin (RPR) test and Enzyme Immunoassay test (EIA)
- Carried out test-respective controls; collection, recording and interpretation of control results
- Carried out Polymerase Chain Reaction (PCR) to identify types of mutations in
- *Mycobacterium tuberculosis* cells
- Executing laboratory decontamination systems
- Executing full blood count (F.B.C)

Laboratory Clerical work

- Creating and presentation of laboratory reports; test results, decontamination reports, and control reports
- Stock-taking of reagents and instrumentation

EDUCATION BACKGROUND

Tertiary Education: The Copperbelt University **2014-2017**

BSc Biology Biotechnology Major

Secondary Education: St. Clements Secondary, Mansa **2008-2012**

G.C.E O LEVEL Certificate

PERSONAL SKILLS AND INTERESTS

- An avid reader of fiction and non- fiction books
- Passionate orator and shrewd learner
- Short and long fiction writer
- Writing poetry
- Singing and rapping

REFERENCES

Dr Mutondo Moola, Programme Coordinator- Biotechnology
The Copperbelt University
(+260) 966-476-490
mmutondo@gmail.com

Mr. Joshua Chikonde, Chief Coordinator
Marketing Centers Cavendish University Zambia
jchikonde@cavendish.co.zm
+260 97 6861828

Mr. Kenny Situtu, Quality Officer,
Tropical diseases research Centre, Ndola
(+260) 969-600-554

Dr. Sichilima Alfred, Biology Department
The Copperbelt University
(+260) 968-040-435
alfred.sichilima@cbu.ac.zm

Eng. Mwansa Kelvin Chibwe, Director
Climax Environmental and Technical services
(+260)966-122-943, (+260) 979-844-419

Eng. Katongo Chilufya, Mine Manager
Sino Kaiyuan Minerals Limited, Kasempa
(+260) 966745940
Katongochilufya187@gmail.com

CERTIFICATION

I, Mpundu Charles Chilumba Mulenga, certify that to the best of my knowledge and belief, this information correctly describes myself, my qualification and my experience.

CHIBWE MUSONDA

Environmental Engineer | Operations Specialist

Kitwe, Zambia | +260973306437 | chibwemusonda97@outlook.com

PROFESSIONAL SUMMARY

Environmental Engineer with over 2 years of experience in compliance monitoring, environmental assessments, and hazardous waste management. Proven expertise in air quality monitoring, data analysis, and regulatory adherence across mining and industrial sectors. Adept at leading field operations, designing environmental management plans, and delivering actionable insights to drive sustainability. Certified in ISO 14001, 9001, and 45001 standards.

KEY SKILLS

- **Compliance & Regulations:** ZEMA standards, ISO 14001/9001/45001
- **Technical Expertise:** Air quality monitoring, Stack Emissions Sampling, Water Sampling, Noise Sampling, hazardous waste management, GPS applications
- **Field Operations:** Environmental sampling, industrial hygiene surveys, EIA Operations
- **Tools:** Data analysis software; ArcGIS, Microsoft Office Suite
- **Soft Skills:** Collaborative leadership, problem-solving, technical reporting

WORK EXPERIENCE

Operations Engineer
Climax Environmental and Technical Services Ltd | Kitwe, Zambia | 06/2024 – Present

- Lead compliance monitoring for industrial clients, ensuring adherence to ZEMA and ISO 14001 standards.
- Conduct environmental impact assessments (EIAs) for mining and Developmental projects, streamlining regulatory approvals.
- Manage field operations for air/water quality monitoring, reducing non-compliance incidents by 25% through proactive data-driven strategies.
- Collaborate with cross-functional teams to design mitigation plans for high-risk environmental areas.

CHIBWE MUSONDA - CV

Project Engineer
Techsol Services Ltd | Kitwe, Zambia | 05/2023 – 04/2025

- Spearheaded dust monitoring projects at 3 major mining sites (Kagem, Mimbula, Limestone), achieving 90.73% compliance rates.
- Authored 15+ detailed compliance reports, enhancing client adherence to environmental regulations.
- Utilized GIS tools to map particulate matter dispersion, informing site-specific mitigation strategies.

Environmental Engineer
BluePrint Environmental & Construction Ltd | Kitwe, Zambia | 06/2022 – 05/2023

- Co-developed 10+ environmental management plans (EMPs) for industrial projects, ensuring 100% regulatory approval.
- Managed hazardous waste disposal for Impala Terminal Logistic Co., achieving zero safety incidents.
- Conducted 20+ field inspections, resolving 95% of compliance gaps within 30 days.

EDUCATION

Bachelor of Engineering in Environmental Engineering
The Copperbelt University | Kitwe, Zambia | Graduated: 08/2023

School Certificate
Mansa Secondary School | Mansa, Zambia | Completed: 12/2015

CERTIFICATIONS

- ISO 14001:2015 (Environmental Management Systems) | Alison | 2023
- ISO 9001:2015 (Quality Management Systems) | Alison | 2023
- ISO 45001:2018 (Occupational Health & Safety) | Alison | 2023
- Practical GIS in EIA Process | KEGS | 2022
- Graduate Engineer | Engineering Institution of Zambia (EIZ) | 2023

CHIBWE MUSONDA - CV

PROJECTS & RESEARCH

Particulate Matter Exposure in Public Transport Stations
Kitwe Town Centre | Feb 2022 – Sept 2022

- Analyzed PM2.5/PM10 levels across 5 stations, identifying 3 high-risk zones.
- Proposed cost-effective ventilation upgrades, reducing particulate exposure by 40% in pilot tests.

PROFESSIONAL AFFILIATIONS

- Member, Engineering Institution of Zambia (EIZ)

References available upon request.

Sign

NATHAN KAELA

Address: Ndeke Village, Kitwe, Zambia.
Phone #: +260 962 121614
Email: nathankaela@gmail.com
Nationality: Zambian
NRC #: 456382/61/1

OBJECTIVE

To work in an environment which encourages me to succeed and grow professionally to better extents where I can use my skills and knowledge appropriately.

I endeavor to utilize keen analysis and insights and team approach to drive organizational improvements and implementations of best practices. I possess superior interpersonal skills, capable of resolving multiple and complex (Engineering, Sales, Human Resources, Legal, Distribution and SHEQ) issues and motivating others to peak performance.

I am educated to a degree level.

EXPERIENCE

APRIL 2022 – PRESENT

RETAIL TERRITOEY MANGER, RUBIS ENERGY ZAMBIA

ROLES

- Conduct stock controls in all the service station to avoid product dumping by dealers by gauging dip readings and picking meter readings to verify compliance with exclusive supply guidelines.
- Identify lags in Dealer performance and delivery of operational excellence. train, support and advise Dealers and equip them with appropriate tools.
- Reports on station performance by conducting the Profit and loss analysis.
- Ensure dealers, supervisors and pump attendants offer the best customer care daily housekeeping standard are upheld.
- Train all retail sites once every quarter on the product range, safety customer care and other Rubis products like Lubes, Rubis card and Rubis convenience store.
- Account Management by recovering receivables and collecting unpaid invoices to ensure all outstanding balances are cleared.
- Ensure all retail sites attain set targets for White Fuels, Lubes and LPG by processing orders, maintaining high stock levels and encouraging dealers to have account holders.
- Control HSEQ standards, stations quality levels and maintenance activities.

ACHIVIEVEMENTS

- Rubis won the best customer service provide award for the year 2022 with the northern region having the best performance across Rubis Network
- Collected all payments for overdue invoices reducing the TAR to less than thirty days

- Improved volumes for three stations from achieving 50% of their volumetric targets to achieving 100%
- Improved the housekeeping for the stations and the general attendants' attitude towards work.
- Manage three portfolios i.e Lubes, LPG and Northern Region Retail. Exceeding target in LPG and maintaining the targets for retail and Lubes.

AUGUST 2020 – 2022 APRIL
LUBRICANTS AREA SALES MANAGER, RUBIS ENERGY ZAMBIA

Worked as a Lubricants Territory Manager who delivered exceptional level of service to each customer.

ROLES:

- Managed quality assurance program, including on-site evaluations, and customer surveys.
- Training station attendants on the general station conduct, under bonnet check, display of Rubis products and handling of LPG as required by the Energy Regulation Board (ERB)
- Managed the inventory of Lubricants held in the warehouse, including monitoring stock levels and ordering replacements when stock levels are low and based on projected sales.
- Negotiated purchase prices with the suppliers where my role was to advise on current market prices and provide the estimated landing cost.
- Worked closely with the clearing agency to ensure goods are don't take long to be cleared on the boarder.
- Customer accounts management – payment collection, payment allocation, raising memos and delivering them to the client.
- Merchandising of Lubricants and LPG at all Rubis service stations.
- Handling of purchase orders and ensuring that they are delivered to the customer, delivering to the customer in absence of a transport.
- Growing the network by enrolling new customers, taking part in radio shows and station activation for the retail business.

Achievements

- Increased the margin by over 60% while maintaining the monthly volumetric sales
- Negotiated for a six-months of supply of Lubricants at a constant price which was the best deal in the company history.
- Eliminated monthly losses by getting involved in product costing with finance department.
- Eliminated irregularities between warehouse and system stock balances.
- Introduced a uniform pricing system for Lubricants and LPG on all Rubis Energy service stations across the Rubis Network

JULY 2018 – NOVEMBER 2018
PETROLEUM ANALYST, ALFRED H KNIGHT

Worked as a laboratory petroleum analysis and performed the following duties.

- Carried outs laboratory testes like Flash point, Karl Fischer, Kinematic Viscosity, Sulphur contents in diesel, density and electric conductivity in transformer oil.
- Assisted the department with technical support in troubleshooting laboratory equipment to support and ensure customer satisfaction.
- Carried out laboratory tests on water and air quality

2

- Performed data analysis and provided recommendations to achieve both departmental and organizational objectives.
- Handled all the monthly data entry and quality control analysis.
- Prepared weekly safety talks and reports to ensure a safe working environment was achieved and the safety guidelines were observed.
- Stock taking of the new and old chemical reagents and other laboratory essentials as well as preparation of check samples and test solutions.
- Provided recommendations where necessary as per objective of the department.

JUNE 2019 - AUGUST 2019
PLANT ATTENDANT, ZESCO

- Water treatment from raw water intake point to pumping water to the reserve tanks, this included filtering raw water, chlorination, backwashing of the filters and monitoring the pumping station.
- Water distribution in the whole township which involved the opening and closing of valves to ensure that the circulation of water in the community.
- Writing of water flow rates, chlorine dosage and both plant activities and safety risk assessment reports daily.
- Assisted with mechanical maintenance works of pumps and valves and responding to faults patenting to water treatment, pumping and distribution of the water.

EDUCATION

COPPERBELT UNIVERSITY BACHELOR'S DEGREE
OCTOBER 2019
Bachelor of Engineering In Chemical Engineering

DAVID KAUNDA NATIONAL TECHNICAL, LUSAKA — *HIGH SCHOOL*
JANUARY 2010 - NOVEMBER 2012
General Education Certificate

MASALA SECONDARY SCHOOL, NDOLA — *SECONDARY*
JANUARY 2008 - NOVEMBER 2009
General Education Certificate

LUBUTO PRIMARY SCHOOL, NDOLA — *PRIMARY*
JANUARY 2001 - NOVEMBER 2007
General Education Certificate

3

SKILLS

- Able to work in multicultural work environment with strong communication skills.
- Can work under deadline pressure and deliver high quality results.
- Able to organize and lead a planned program of further growth.
- Making high level decisions about policy and strategy.
- Creative problem solving, ability to use initiative and work independently.
- Conversant with Microsoft office applications.
- Able to analyze petroleum prices both local and international.
- Currently in possession of a driver's license class B- (no restrictions).

ACTIVITIES

Playing and Watching football
Current Affairs
Watching movies

REFERENCES

Dr John Siame - "Copperbelt University" Dean of School of Mines and Mineral Sciences
Email: john.siame@cbu.ac.zm
Contact: +260969206022

Matende Kalumba - "Alfred H Knight" Technical Analyst
Email: matendekalumba@gmail.com
Contact: +260950359972

Dorica Chiboya "Rubis Energy Zambia "B2B Manager
Email: dorica.chinoya@rubiszambia.com
Contact: +26069200823

I acknowledge that the information provided represents my academic qualifications and experience as a chemical engineer.

Sign:.....

4

MUBANGA MUTALE

Socio-economic Scientist

Mobile: +260 970 424 159 / +260 954 236 206
Email: albinamubanga@gmail.com
Date of Birth: 1991

Professional Summary

Dedicated Socio-economic Scientist with over 3 years of progressive experience contributing to Environmental Impact Assessments (EIA) and community-based research projects. Possesses a strong academic background in Economics and a proven track record in socio-economic data collection, stakeholder engagement, impact analysis, and policy compliance. Adept at using statistical tools (SPSS, STATA, Excel, ODK) to inform data-driven environmental and social decisions. Committed to advancing sustainable development goals through evidence-based planning and community consultation.

Core Competencies

- Socio-economic Impact Assessment
- EIA Report Preparation
- Community Engagement & Stakeholder Consultation
- Data Collection & Statistical Analysis (SPSS, STATA, Excel, ODK)
- Policy & Regulatory Compliance
- Team Collaboration & Coordination
- Report Writing & Documentation

Education

Bachelor of Science in Economics – Copperbelt University, Kitwe, Zambia (2019–2023)

General Certificate of Education – O-Level – Ndola Girls' National Technical Secondary School (2015–2017)

Relevant Experience

Socio-economic Research Assistant – Freelance / Project-based Consulting (Jan 2022 – Present)

- Participated in EIA study teams for proposed infrastructure and industrial developments.
- Conducted baseline socio-economic surveys and stakeholder interviews in rural and peri-urban settings.
- Analyzed household income, health, education, and land-use patterns to inform impact mitigation plans.
- Assisted in preparing socio-economic chapters of EIA reports in compliance with ZEMA guidelines.
- Supported community sensitization and disclosure meetings.

Branch Supervisor / Compliance Officer – Instapay Africorp Ltd, Kitwe (Nov 2024 – Present)

- Oversaw operations and ensured compliance with financial regulatory frameworks.
- Led team supervision and trained new staff on customer engagement and data handling.
- Supported CSR initiatives and local community engagements.

Junior Associate – Instapay Africorp Ltd, Kitwe (Apr 2024 – Nov 2024)

- Conducted market research and financial advisory activities.
- Assisted in administrative support and customer profiling, often drawing from socio-economic data.

Administrative Assistant Intern – Naltam Investment Limited (Sep 2022 – Dec 2022)

- Maintained records and supported documentation for community-based projects.
- Handled socio-economic data entry and report drafting under supervision.

Certifications

Data Analysis Tools – Copperbelt University
Software: Excel, SPSS, STATA, ODK

Professional Affiliations

Committee Member, Copperbelt University Economics Association (CUEA), 2022/2023

Referees

Dr. Lewis Kunda – Lecturer, The Copperbelt University
Email: lewiskunda98@gmail.com | Phone: +260 965 363 719

Mr. Noah Mutale – Director, Naltam Investment Limited
Email: noraph38@gmail.com | Phone: +260 976 081 690

Mr. Moses Mwamba – Branch Supervisor, Instapay Africorp Ltd
Email: mosesmwamba57@gmail.com | Phone: +260 977 469 595

Sign:

CURRICULUM VITAE

Titus Mulenga
7th Mwenda Street, Nkana East
mulengatitus135@gmail.com
+260 968072866/+260 978627774

Relevant Experience	

• *Air, Water and Noise Monitoring*
• *Environmental Engineer*
• *Asset Survey*
• *GIS Analyst*
• *Auditor*
	• Environmental and Social Impact Assessment in projects including:
	  ▪ Mineral exploration (manganese, copper, iron ore, lithium, tin and gold) by Droplex Industrial System Limited- (Copperbelt Environmental Consultants Ltd)
	  ▪ Small-scale copper processing plant by Kabula Mining Resources Limited- (Stuwi Environmental and Suppliers Ltd),
	  ▪ Small-scale mineral exploration (Copper, Silica and Gold) by Stalwart Investments Limited- (Copperbelt Environmental Consultants Ltd)
	  ▪ Construction of a tailings storage facility by Sino-Africa Resources and Smelting Limited- (Copperbelt Environmental Consultants Ltd)
	• Stakeholder Engagement in projects, including
	  ▪ Mufulira–Mukambo Interconnector- (AMC, 2024)
	  ▪ Small-scale copper processing plant by Kabula Mining Resources Limited- (Stuwi Environmental and Suppliers Ltd),
	  ▪ Zambia–Tanzania Interconnector (AMC & WSP, 2024–2025)
	• GIS and Remote Sensing
	  ▪ Mapping for El Niño 2023 Early Warning and Anticipatory Action-(Humanitarian Open Street Map Team (HOT) & Open Mapping Hub Eastern & Southern Africa.
	• Air and Water Quality Monitoring
	  ▪ Environmental Monitoring (Air, Water and Noise) at Dangote Cement Zambia - (Copperbelt Environmental Consultants).
	  ▪ Environmental Monitoring (Water) at Rong Xing Investments Limited -(Climax Environmental and Technical Services ltd).
	• Pollution Control and Solid Waste Management

	• Conducted research on waste management and designing of fat waste recycling protocol. Kansanshi Mining Plc • EPF Auditing and Environmental Modelling • CNMC Luanshya Copper Mines Plc EPF Audit – 2023- (Copperbelt Environmental Consultants). • SAN HE (Zambia) Manufacuring Ltd EPF Audit-2025 • Field Data Collection and Spatial Analysis • Mufulira–Mukambo Interconnector- (AMC, 2024) • •Luano–DRC Interconnector (EHG Consultancy, 2025) • Report Writing and Technical Documentation • Environmental Clean Up • Diesel Spillage Response Operations Mt Meru Vehicle Bba 1629 Accident, Lumwana Area, Kalumbila- (Climax Environmental and Technical Services, 2025)
Environmental and Social Impact Assessment	• Zambia–Tanzania Interconnector (AMC & WSP, 2025) –Assisted in Herpetofauna biological Surveys as a field assistant. • Lobito Corridor Project (AMC & Armitage, 2025) – Supervised data collection, Asset surveying and GIS mapping. • Zambia–Tanzania Interconnector (AMC & WSP, 2024–2025) – Community engagement, environmental/social/economic surveys, and Asset Surveying. • Mufulira–Mukambo Interconnector (AMC, 2024) – Participated in focus group discussions, field data collection and Asset Surveying. • Luano–DRC Interconnector (EHG Consultancy, 2025) – GIS mapping and validation of social and environmental data and Asset Surveying. • Environmental Consultancy Work (Odrin Consulting Group) – EIA report preparation, mitigation planning. • Environmental Consultancy Work (Copperbelt Environmental Consultants) – EIA report preparation, mitigation planning and Environmental Protection Funds(EPF) Audits.
Environmental Management Experience	• Designed solid waste and recycling programs (Kansanshi Mining Plc). • Oversaw pollution control through sampling (soil, air, water) and audits (Copperbelt Environmental Consultants).

	• Conduct spatial analyses to assess land use patterns, habitat fragmentation, and environmental risks.
Qualifications	
Academic and professional qualifications	• Bachelor of Engineering in Environmental Engineering – Copperbelt University, Zambia (2018 – 2023)
Short Courses	• Certificate in principles of environmental sampling, Groundwater and surface water monitoring, and Fallout dust monitoring – Kansanshi Mine Training Centre, Zambia (2022 – 2022) • Certificate in Occupational health and safety – Southway Infotech Institute, Zambia (2023 – 2023) • Certificate in Basic entry-level Python programming, database design & development, basic drone flying & programming, and satellite image acquisition & processing – Copperbelt University, Zambia (2022 – 2022)
Membership to professional bodies	• Member of the Engineering Institute of Zambia
Declaration	
I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any misrepresentation may lead to my disqualification from participating in the project.	

06/07/2025

CURRICULUM VITAE

PERSONAL DETAILS

Surname	:	Kangwa
First Name	:	Bwalya
Profession	:	Metallurgy-Diploma
Contact Address	:	HSE No 189 Ndeke Presidential,Kitwe
Marital status	:	Single
Date of Birth	:	24th November 1989
Sex	:	Male
Nationality	:	Zambian
NRC Number	:	424228/67/1
Mobile Number	:	+260765602813
Email Address	:	bkangwa71@yahoo.com/bwalyakangwa3@gmail.com

CAREER OBJECTIVE

Willingness to learn and progress whilst being open minded to various challenges

EDUCATION BACKGROUND

Tertiary
2008-2011: The Copperbelt University-Awarded a Diploma in Metallurgy

SENIOR SECONDARY EDUCATION

2004-2006: Mindolo Secondary School-Awarded grade 12 school certificate

JUNIOR SECONDARY EDUCATION:

2002-2003- Mindolo secondary School: Awarded Grade 9 School Certificate

-Class Monitor

PRIMARY EDUCATION

1995 – 2001: Ishuko Primary School Awarded Grade 7 Certificate

WORK HISTORY

Job Title : **Student/Sample Analyst- Alfred.H.Knight(2012 February- April)**

Duties Included

Sample preparation, metallurgical assaying

Determining Ore Grindability

2013 - 2014 : Copper Rock field Mine

Job Title : **Technical Trainee -Copper Rockfield Mine (May 2013-june 2014)**

Duties Included

- Optimization of the processing capacity of the operation
- Monitoring the density separation processes of gold nuggets from the gold bearing ore
- Generating production reports

Job Title : **Quality Controller: Zalco Limited-Cable Plant (July 2014-September 2016)**

Duties Included

Monitoring the copper cathode feeding operations, the holding and casting temperaturesof the Up-Casting furnace

- Monitoring the subsequent processes of the copper rod drawing and annealing operations
- Ensuring that the hardness of cooling water to the furnace is kept within range by correct operation of the RO machine
- Keeping measuring equipment operational by following operating instructions and calling for repairs

Job Title: Assistant Metallurgical Research Engineer: Blueprint environment and Construction Company (February 2019-May 2023)

Duties include

- Research work aimed implementing metallurgical research work aimed at implementing process operations that mitigate the associated impacts on the environment

I have worked on the following recent projects;

- Yong Jia Renewable Resources Company Ltd: EIA for a Copper Ore Flotation Plant
- Chambishi Resources: Copper leach plant
-

Job Title: ISA Furnace Control Room Operator: Chambishi Copper Smelter (May 2023-to present)

Duties include

- Maintaining high housekeeping and safety standards
- Operating equipment according to procedures given in the operating strategies and instructions
- Conducting all routine tasks which include field check-sheets and equipment inspection in timely and accurate manner
- Diagnose plant defects and ensuring they are immediately escalated to superiors
- Identifying equipment that requires correction and immediately escalated to superiors
- Support maintenance in the delivery of their tasks
- Compliance to health safety and environmental requirements and reporting defects and unsafe conditions to the supervisor
- Equipment accountability from the ISA feeding plant, conveyor belt feeders, electromagnet metal detectors, ISA furnace and all ancillary ISA equipment.
- Strict adherence to safe and prompt start-up an and shutdown procedures in a team environment
- Perform other duties as assigned by the supervisor

OTHER SKILLS

- In-house training for occupational health and safety -ISO 45001
- Computer proficiency in Microsoft Word, Microsoft Excel documents, Outlook.
- Quality Control Management Systems- ISO 9001

HOBBIES

- Reading technical mining/metallurgical journals and related support operations
- update in educational opportunities

REFERENCES

Eng Ben Kaoma
Blueprint Environmental
And Construction Ltd
Cell: 0966820158
KITWE

Mr. Danny Choba
Production Manager Zalco LTD-Cable Plant
Cell: 0979309684
KABWE

Mr.P.Chanda
Chief Sample Analyst
Alfred.H.Knight
Cell: 0969543891
KITWE

Sign:

CURRICULUM VITAE FOR REX CHAABA

Rex Chaaba
House No. 22,
Almalik Street Riverside, Kitwe.
Copperbelt - ZAMBIA
Cell: +260967669580 / 0770904343
Email: chaabarex@gmail.com

Nationality : Zambian
Date of Birth : 08th February, 1995
Marital Status: Single
NRC Number: 305303/31/1
Religion : Christian

MINING ENGINEER PROFESSIONAL SUMMARY

Enthusiastic, results-driven Mining professional offering relevant practical work experience of underground mining with a qualification of Degree of Bachelor of Engineering in Mining Engineering (CREDIT) from the Copperbelt University. Key strengths include. Excellent relationship and team-building, Leadership, organizational and communication skills. A full comprehension of Mine Safety, Mine Operations, Mine Design, Mine Scheduling, Greenfield Projects, Research and Analysis, Special Projects Planning and Implementation, Materials Handling Ground Control, Drill and Blast. Currently a Registered Member of the Engineering Institution of Zambia (EIZ) possesses a Blasting Licence (BL) for All Mining Operations (AMO).

SKILLS

- Research and Data Analysis
- Problem solving and decision making
- Adaptability
- Interpersonal communications
- Work under pressure
- Efficient •
- Team player
- Datamine
- Rock science
- Advanced mining knowledge and experience
- GEOVIA Surpac
- Fast Learner
- Time management
- Advanced skills in Microsoft Office Packages - Word, PowerPoint, Excel

KEY WORK EXPERIENCE

MINING ENGINEER, 2021 TO 2024-MOPANI COPPER MINES PLC

Key Responsibilities:

- Familiarization with general underground trackless mining operations using sublevel open stopping and cut and fill mining methods
- Appreciation of rock mechanics, mine planning, mine survey, mine ventilation and mine transportation and materials handling systems, drilling and blasting
- Effective Supervision: To observe work according to the mine plans for the particular day.
- Analysis of the productivity of mining equipment: This included knowing the equipment size, the bucket capacities, determination of the fuel factors, the fill factors and the cycle time.
- Geological knowledge of the mineralisation of the Mopani Copper Mines Plc.
- Underwent a through Graduate Development programme and obtained a Blasting Licence for All Mining Operations
- Mining safety and ground control
- Declaring blast areas safe before and after detonation of explosives
- Ensuring that all explosives are detonated, and reporting and attending to misfires
- Ensuring that workplace safety and explosives handling, storage and transport procedures and regulations are followed
- Mining Operations Familiarisation: Safety, drilling, blasting, load and haul
- Conducting Core logging

PROFESSIONAL EDUCATION

- 2017-2023: B.Eng. in Mining Engineering, The Copperbelt University.
- 2012-2014: Grade 12 School Certificate, Mwense Secondary School.

AFFILIATIONS

- Member of the Engineering Institution of Zambia (EIZ)

CERTIFICATIONS

- Blasting License Holder for All Mining Operations: Ministry of Mines Zambia

JOB RELATED SKILLS

- High computerized skills with ability to use GEOVIA Surpac, Slide, Rockscience software, and Microsoft Excel/office.
- Good team player who can work with people from different fields, cultures and countries
- Good organization and event planning skills that help meet organization goals
- Ability to collaborate with others in developing creative and strategic solutions to achieve common goals.
- A fast and enthusiastic learner with initiative and desire to succeed.
- Ability to respond quickly to changing priorities.

REFEREES:

Warren Mwenya

Senior Geotechnical Engineer at Mopani Copper Mine PLC, Nkana South Mine.

Contact: +260966321355 & +260954598776

Dr. Shane Agabu

Lecturer, school of mines and mineral sciences.

Copperbelt Copperbelt University

Contact: +260977457561

11.10 APPENDIX 10: APPROVED TORs

11.11 APPENDIX 11: INVITATION LETTER OF THE DISCLOSURE

MEETING

CLIMAX ENVIRONMENTAL & TECHNICAL SERVICES LTD
Katilungu house, Plot No. 56J5+6HJ, Obote Avenue, Kitwe.
Phone: +260 966 122 943 +260 979 844 419
Email: climaxenvironmental@gmail.com

6th January 2026

Att;.....

SUBJECT: INVITATION DISCLOSRE MEETING FOR AN ENVIRONMENTAL IMPACT ASSESSMENT.

I hope this message finds you well. We are writing to formally invite you to participate in a disclosure meeting as part of the ongoing Environmental Impact Assessment (EIA) process for the proposed Expansion of Leach Plants 1 & 2 And Construction of a Copper Ore Processing Plant on Subdivision A of Subdivision E of Lot No. L/541/M, Chambishi, Kalulushi District, Copperbelt Province by Rongxing Investments Limited. The disclosure meeting is a crucial step in ensuring that the key findings of the baseline study of the EIA for the proposed project are communicated to relevant stakeholders.

Date: 12th January 2026

Time: 10:00hrs to 12:30hrs

Location: Garden Court, Kitwe District.

Agenda:

1. Welcome and Introduction
2. Project Overview
3. Presentation of the Key finding
4. Mitigation/ Enhancement measures for key environmental concerns and issues
5. Next Steps and Timeline
6. Any other business

Thank you in advance for your cooperation and participation in this important phase of the EIA. Your input and feedback are instrumental in shaping a comprehensive assessment that aligns with environmental regulations and community interests.

Should you have any questions or require further information, please do not hesitate to contact us on **0966122943** or climaxenvironmental@gmail.com

We look forward to your positive response and to productive discussions at the disclosure meeting.

Warm regards,

Eng K. Mwansa

11.12 APPENDIX 12: MINUTES OF THE DISCLOSURE MEETING

MINUTES OF THE DISCLOSURE MEETING FOR THE PROPOSED EXPANSION OF LEACH PLANTS 1 & 2 AND CONSTRUCTION OF A COPPER ORE PROCESSING PROJECT BY RONGXING INVESTMENTS LIMITED

Date: 12th January 2026

Location: Garden Court, Kitwe District.

Time: 10:52 hrs – 12:15 hrs

1. Introductory Remarks

The meeting was called to order at 10:52 hrs by Eng. Kelvin Mwansa of Climax Environmental & Technical Services Ltd. The meeting commenced with an opening prayer led by Eng. Chibwe Musonda. Eng. Kelvin Mwansa welcomed all attendees, including community leaders and government representatives. He introduced the project team from Rongxing Investments Limited, namely Mr. Humphre Songwe (Human Resource), Ms. Yu Chunyan, and Ms. Susan Chimpusa, as well as himself as the Environmental Consultant who led the Environmental Impact Assessment (EIA) for the project.

2. Presentation of EIA Findings by Eng. Kelvin Mwansa

Project Overview:

RongXing Investments Limited proposes the expansion of Leach Plants 1 & 2 and the construction of a copper ore processing plant in Chambishi, Kalulushi District. The expansion will modernise critical components of Plant 1 and Plant 2, while establishing a new, purpose-built raw material preparation and acid curing complex on Plot 19. The facility is designed to handle approximately 4,000 tonnes per day of low-grade feedstock, comprising tailings and overburden oxide ore. The project site covers approximately 30 hectares within an area zoned for industrial use.

Key Environmental Findings:

- Climate: The region has a humid subtropical climate with wet and dry seasons. Mean annual rainfall ranges from 1,100 to 1,300 mm, and the average temperature is around 21°C.
- Air Quality: Air quality is moderate, with dust and PM_{10}/$PM_{2.5}$ levels observed below ZEMA thresholds.
- Geology & Hydrogeology: The area lies in the Central African Copperbelt with permeable

carbonate aquifers. The groundwater table is alkaline and seasonally recharged.

- Hydrology: Surface drainage is seasonal, discharging into the Luela Stream and the Mwambashi Stream, a tributary of the Kafue River. No permanent wetlands are present on-site.
- Soils: Soils are loamy to clayey with slightly acidic to neutral pH. While metal content is elevated, it is consistent with typical mining areas.
- Biodiversity: Limited biodiversity with small generalist fauna (rodents, reptiles, amphibians), urban-adapted birds, and invasive plant species like Lantana. No rare or endangered species were identified.
- Noise & Vibration: Daytime baseline noise levels (40–70 dB) are within acceptable limits. Vibration impacts are negligible.
- Cultural and Socio-Economic Context: The site holds no known archaeological heritage, but cultural relevance to the Bemba and Lamba communities is acknowledged. The area is urbanised with good access to services.

Predicted Impacts and Mitigation Measures:

Positive Impacts:

- Job creation (over 200 positions) for local residents during construction and operation.
- Increased demand for local goods, transport, and services.

Negative Impacts & Mitigation:

- Air Quality: Dust suppression with regular water spraying and road compacting.
- Water Resources: Process water will be recirculated; secondary containment and impermeable liners will be used to prevent leaching.
- Noise: Controlled working hours and equipment maintenance.
- Biodiversity: Buffer zones will be maintained and invasive species managed.
- Health & Safety: Proper PPE, training, and emergency response protocols will be implemented.

3. Questions and Answers Session

Mr. Humphre Songwe (RongXing Human Resource):

Clarification: The land use for the proposed project site has already been changed to industrial. The subdivisions for the project are Plots 17, 18, and 19. The main challenge faced by the company is the presence of illegal settlers on Plot 17, despite compensation having been undertaken on all plots.

Ms Mable Kabwe (Mwazanja WDC):

Concern: There are challenges related to communication between RongXing and landowners. In many cases, landowners (sellers) do not adequately involve or notify settlers or users of the land, which subsequently leads to conflicts.

Answer by Mr. Humphre Songwe (RongXing Human Resource):

Initially, the land where the project is located was under ZCCM title. Therefore, whenever RongXing intends to acquire land, ZCCM is engaged to assist in identifying legitimate landowners with valid titles. RongXing enters into formal agreements with the landowners, which include provisions for compensating settlers and users of the land.

Ms. Claire Mwape (Public Health Inspector, Kalulushi Council):

Concern: The company should ensure close engagement with local council public health inspectors to sensitise surrounding communities on the dangers and health risks associated with living near a processing plant.

Answer by Eng. Kelvin Mwansa:

Encouragement: RongXing is encouraged to utilise all practicable measures to minimise public health risks, including proactive dust control through the use of water bowsers and other effective dust suppression methods.

4. Closing Remarks

The District Commissioner (DC) thanked RongXing Investments Limited for convening the disclosure meeting and emphasised the importance of continuous community engagement. He further urged local leaders to exercise sensitivity and diligence on matters relating to land ownership and legal land acquisition procedures.

Ms. Yu Chunyan provided the final remarks, highlighting the company's newly adopted principle of clear and transparent engagement and the improvement of community feedback mechanisms.

The meeting closed at 12:15 hrs with a prayer led by Mr. Eng. Kelvin Mwansa.

Minutes prepared by: Eng. Chibwe Musonda

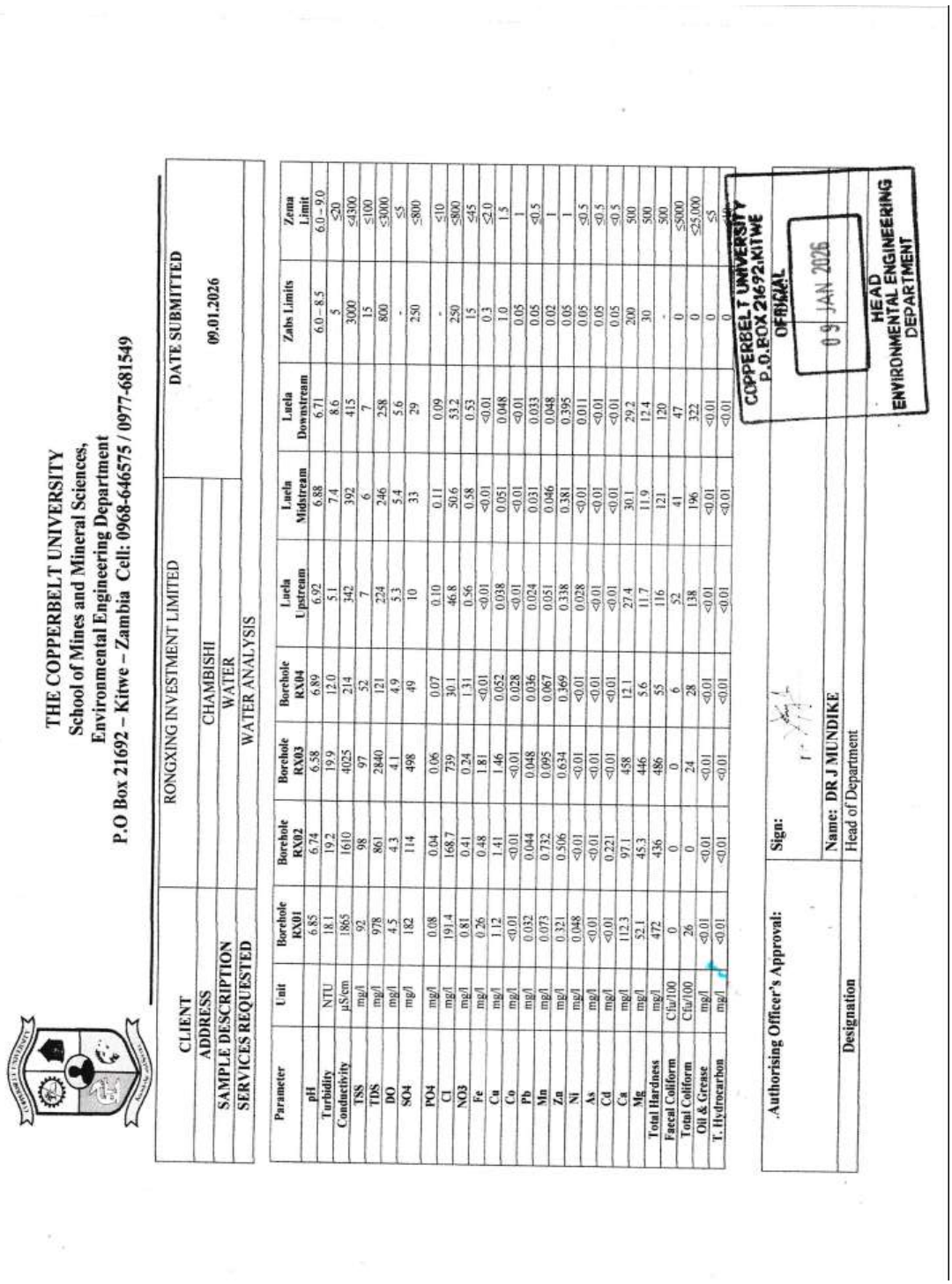
Prepared by:

Eng. Chibwe Musonda - Climax Environmental and Technical Services Limited

11.13 APPENDIX 13: ATTENDANCE LIST OF THE DISCLOSURE MEETING

11.14 APPENDIX 14: PHOTOS OF THE STAKEHOLDER AT DISCLOSURE MEETING

11.15 APPENDIX 15: WATER SAMPLE RESULTS



THE COPPERBELT UNIVERSITY
School of Mines and Mineral Sciences,
Environmental Engineering Department
P.O Box 21692 – Kitwe – Zambia Cell: 0968-646575 / 0977-681549

CLIENT	RONGXING INVESTMENT LIMITED	DATE SUBMITTED	
ADDRESS	CHAMBISHI	09.01.2026	
SAMPLE DESCRIPTION	WATER		
SERVICES REQUESTED	WATER ANALYSIS		

Parameter	Unit	Borehole RX01	Borehole RX02	Borehole RX03	Borehole RX04	Luela Upstream	Luela Midstream	Luela Downstream	Zabs Limits	Zema Limit
pH		6.85	6.74	6.58	6.89	6.92	6.88	6.71	6.0 – 8.5	6.0 – 9.0
Turbidity	NTU	18.1	19.2	19.9	12.0	5.1	7.4	8.6	5	≤20
Conductivity	µS/cm	1865	1610	4025	214	342	392	415	3000	≤4300
TSS	mg/l	92	98	97	52	7	6	7	15	≤100
TDS	mg/l	978	861	2840	121	224	246	258	800	≤3000
DO	mg/l	4.5	4.3	4.1	4.9	5.3	5.4	5.6	-	≤5
SO4	mg/l	182	114	498	49	10	33	29	250	≤800
PO4	mg/l	0.08	0.04	0.06	0.07	0.10	0.11	0.09	-	≤10
Cl	mg/l	191.4	168.7	739	30.1	46.8	50.6	53.2	250	≤800
NO3	mg/l	0.81	0.41	0.24	1.31	0.56	0.58	0.53	15	≤45
Fe	mg/l	0.26	0.48	1.81	<0.01	<0.01	<0.01	<0.01	0.3	≤2.0
Ca	mg/l	1.12	1.41	1.46	0.052	0.038	0.051	0.048	1.0	1.5
Co	mg/l	<0.01	<0.01	<0.01	0.028	<0.01	<0.01	<0.01	0.05	1
Pb	mg/l	0.032	0.044	0.048	0.036	0.024	0.031	0.033	0.05	≤0.5
Mn	mg/l	0.073	0.732	0.095	0.067	0.051	0.046	0.048	0.02	1
Zn	mg/l	0.321	0.506	0.634	0.369	0.338	0.381	0.395	0.05	1
Ni	mg/l	0.048	<0.01	<0.01	<0.01	0.028	<0.01	0.011	0.05	≤0.5
As	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	≤0.5
Cd	mg/l	<0.01	0.221	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	≤0.5
Ca	mg/l	112.3	97.1	458	12.1	27.4	30.1	29.2	200	500
Mg	mg/l	52.1	45.3	446	5.6	11.7	11.9	12.4	30	500
Total Hardness	mg/l	472	436	486	55	116	121	120	-	500
Faecal Coliform	Cfu/100	0	0	0	6	52	41	47	0	≤5000
Total Coliform	Cfu/100	26	0	24	28	138	196	322	0	≤25,000
Oil & Grease	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0	≤5
T. Hydrocarbon	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0	≤5

COPPERBELT UNIVERSITY
P.O.BOX 21692,KITWE
OFFICIAL
09 JAN 2026

Authorising Officer's Approval: Sign:
Name: DR J MUNDIKE
Designation: Head of Department

HEAD
ENVIRONMENTAL ENGINEERING
DEPARTMENT

11.16 APPENDIX 16: APPROVED TORs WITH RESPECTIVE ATTACHMENTS

11.17 APPENDIX 17: PROPOSED PROJECT SITE