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**ENVIRONMENTAL IMPACT STATEMENT FOR THE
PROPOSED OPEN PIT MINE FOR COPPER UNDER LICENSE
No. 26238-HQ-LML IN KASISI AREA CHONGWE DISTRICT,
LUSAKA PROVINCE.**

**BY
SINO XINYUAN MINING COMPANY LIMITED**

Prepared By:

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EXECUTIVE SUMMARY

Project Background

Sino Xinyuan Mining Company Limited is a Zambian-registered mining company, incorporated on the 10th of May 2021, and currently engaged in copper exploration and Large-scale underground mining in Chongwe District, Lusaka Province. The company operates on Lot No. 2677/M, under License No. 26238-HQ-LML within the Kasisi area, and has been extracting copper ore through underground methods under a legally granted license. The mined ore is processed using on-site beneficiation techniques, producing copper concentrate for further refining. The company's operations are based on detailed geological data and historic drilling records originally compiled by exploration teams active in the area dating back to the 1960s. These datasets have enabled Sino Xinyuan to develop a precise understanding of the Kasisi ore bodies, particularly the East and West blocks. Building on the success of its initial underground mining operations, Sino Xinyuan is now seeking to expand and optimize its mining activities by transitioning to open pit mining within the Kasisi East ore body. This shift is intended to improve ore recovery, increase daily production capacity, and reduce operational complexity.

Sino Xinyuan Mining Company Limited is proposing the development of a new open pit copper mine targeting the Kasisi East ore body, located within the company's existing license area, 26238-HQ-LML in Kasisi, Chongwe District. The proposed development marks a progression from its current underground operations to a surface mining method designed to extract ore more efficiently. The transition to open pit mining is aimed at enhancing operational safety and productivity while optimizing the recovery of high-grade copper from near-surface ore zones. Sino Xinyuan Mining Company Limited is committed to implementing this project in compliance with Zambia's environmental and mining regulations, supported by appropriate environmental management plans (EMPs), stakeholder engagement, and long-term monitoring frameworks.

Objectives of the project

The main objective of the proposed project involves the development and operation of a copper open pit mine. The Copper ore when mined will be processed at the existing processing facility.

The scoping report has been prepared on behalf of Sino Xinyuan Mining Company Limited. They represent the scope of service to be followed by all project stakeholders throughout the project phases and the views gathered.

Specific objectives:

- To describe the nature and activities of the proposed copper mining activities.
- To identify possible environmental and social impacts and suggest corrective measures for guiding the project
- To ensure that the operations are done in a safe and environmentally conscious manner
- To employ people with the priority being given to the local community

Location of the Project Area

The proposed Kasisi East open pit copper mine is located in Chongwe District, approximately 40 km east of Lusaka Central Business District (CBD) and about 20 km from Kenneth Kaunda International Airport (KKIA). The project site lies within the Kasisi Area under the Large-scale mining license (No. 26238-HQ-LML). The project site is accessible via the Great East Road and Kasisi Road, with the final 2 km stretch branching off from a gravel road near Kasisi Mission. The Chongwe River lies approximately 2.09km south of the proposed pit, indicating the need for hydrological and environmental safeguards. The area is characterized by mixed-use rural development, with agricultural activities being predominant. The project will be implemented with attention to land-use coordination, stakeholder engagement, and environmental compliance.

The surrounding landscape includes:

- Kasenga Farm Block to the west and north,
- Kasenga B Cemetery 1.6 km north,
- Kasisi Area to the south.

Key nearby developments include:

- Kumena Basic School (2.45 km north),
- CMML Church (2.5 km northwest),
- Farmhouses, sheds, cultivated fields, and center pivots used by Kasisi Farmers Trust within the proposed site boundary.

Table 1: Geographic Coordinates of the proposed project

Coordinates (WGS 84, Zone 35S)	
Latitude	Longitude
15°13'11.99"S	28°33'23.00"E
15°13'11.95"S	28°33'28.90"E
15°13'20.70"S	28°33'29.54"E
15°13'20.85"S	28°33'23.68"E

Shareholders

The tables below present the shareholders and directors of Sino Xinyuan Mining Limited.

Table 2: Shareholders and Directors

Present forenames and surnames	Nationality	Identity Type	Identity Number	Director / Partner	Secretary	Shareholder / Member	Shares (%)	Actual Shares Amount
Xichun Zheng	CHINA	Passport	E18469815	Yes		Yes	30%	4,500
Haibo Zheng	CHINA	Passport	EH1404096	Yes		Yes	70%	10,500
Xuejiao Zeng	CHINA	Passport	E34042825	Yes	Yes	-	-	-

Investment cost

The project investment cost is estimated at \$9 million dollars.

Summary description of the Project

Project Overview

Sino Xinyuan Mining Company Limited proposes the development of a new open pit copper mine targeting the Kasisi East ore body, located within the company's existing large-scale mining license area No. 26238-HQ-LML, in Kasisi, Chongwe District of Lusaka Province. The project site is approximately 40 km east of Lusaka's CBD and 20 km from Kenneth Kaunda International Airport (KKIA), with access via the Great East Road and Kasisi Road.

The proposed project represents a strategic transition from the company's current underground operations to a surface mining method, optimized for extracting high-grade copper from shallow ore zones. The project footprint covers approximately 8.5 hectares and includes the construction of a single open pit and a dedicated overburden storage facility.

Technical and Operational Overview

➤ Open Pit Design:

- Depth: 45 meters
- Surface boundary: 256 m × 218 m
- Floor boundary: 218 m × 128 m
- Ore thickness (avg.): 3.43 m
- Average grade: 3.72% Cu
- Estimated total ore volume: ~565,101 tonnes
- Contained copper: ~21,000 tonnes
- Daily production target: 500–800 tonnes
- Haul road gradient: 8–11%
- Bench face angle: 55–65°; berms: 5 m wide, 1 m high

➤ Overburden Storage Facility:

- Base area: 300 m × 300 m

- Top area: 200 m × 200 m
- Height: 30 meters
- Slope angle: 31°

The open pit operation will use conventional "Excavate-Load-Haul" methods, involving site clearing, topsoil stripping, controlled blasting (minimal due to shallow ore), excavation, ore haulage to the existing processing plant, and waste rock disposal. Dewatering systems and grade control practices will be implemented to ensure safety, efficiency, and ore recovery.

Product and By-products

- **Main Product:**
 - ✓ High-grade copper ore (3.72% Cu), processed at the existing on-site beneficiation plant to copper concentrate intended for smelting or further refining at off-site facilities.
- **By-products:**
 - ✓ Waste rock, overburden, and topsoil – to be managed through engineered storage and progressive rehabilitation.

Supporting Infrastructure and Inputs

The project will leverage existing infrastructure developed for underground operations, including haul roads, power supply, processing plant, workshops, water supply, accommodation, and clinics. Additional inputs required for the open pit operation include:

- Explosives (ANFO, detonators)
- Fuel, lubricants, and drill consumables
- Concrete, steel, liners, and dewatering equipment
- PPE and safety equipment

Environmental and Safety Considerations

Key environmental controls include dust suppression, stormwater management, progressive rehabilitation, noise and vibration controls, and comprehensive monitoring (air, water, noise, biodiversity). Health and safety will be supported through structured training, PPE use, safety audits, and emergency preparedness protocols.

Project Phases and Timeline

- **Preparation Phase:** Obtain approvals and initial procurement (July– September 2025)
- **Development Phase:** Earthworks, access road development, berms, drainage systems, and pit development (October–December 2025)
- **Operation Phase:** Mining, haulage, grade control, processing, and environmental monitoring (Early 2026 onward)
- **Closure Phase:** Pit closure, equipment removal, haul road dismantling, waste dump stabilization, revegetation, and long-term monitoring

The total life of mine is estimated at approximately **5 years**, based on the ore body’s geometry and projected production rate.

Project Alternatives

Considered Product/Service

There is readily available copper ore at Kasisi East Ore Body. Therefore, copper ore Mining was seen to be a much more viable business, also because of the lucrative market for copper on both in Zambia and on the international market.

Considered Site

Most of the potential areas in Zambia are under mining activities hence the choice of where to conduct mining is largely determined by availability of mineral resources and the license by the Ministry of Mines and Minerals Development. Therefore, there was no option for the site.

Considered Mining method

The first option which was selected was the development of an open pit mine for extraction of copper which will involve the removal the overburden, and cleaning of the ore to obtain copper. The first option was selected because surface mining, is more advantageous in terms of ore recovery, operational flexibility, productivity, safety, and cost. And was seen to be the most feasible and cost effective.

Considered Technology

The proposed project will involve the use of surface mining which will have technology options, the first option considered is: site preparation, overburden drilling and blasting, loading and hauling overburden (waste), drilling and blasting the deposit, loading and hauling the ore, and reclaiming the site. The option was considered since the mineral being targeted will require more benches and that the overburden is removed and with the plans of future reclamation of the site.

Considered Source of Energy

The first option is the use of generators to facilitate lighting, and other machinery requiring energy, this is recommended for remote locations. The other option includes using of electricity provided by ZESCO, which is not possible because of the remoteness of the project location from the grid line.

Considered Raw Materials

The first choice of the raw materials included the following: equipment's (excavators, loaders, and haulage trucks). The first choice was selected because it is efficient compared to other options which will take too long and pose more threat to a lot of workers who would be required to manually break the rocks.

Considered Water Source

The first option which was considered was sourcing the wash water from the boreholes on existing facilities which will be very minimal whilst utilizing bottled water for drinking.

Considered Waste Management Method

The first option was the disposal of solid waste at the designated existing dump site for the current operating Mine. The first option was the best option considering that it is environmentally sustainable.

Considered Sanitary Waste Management

The first option was the use of portable toilets. The first option of using portable toilets was selected considering the nature of operations.

Sino Xinyuan Mining Limited conducted thorough feasibility study for the proposed project. The implementation of the proposed project will also bring along socioeconomic benefits for the project area, region and the country at large. Therefore, the company believes that the best option was to implement the project in line with the presented project description whilst protecting the environment in line with the international best practice and the laws of Zambia

No Project Option

The "No Project Option" would negatively affect the development of the mineral resource and hence deprive the country of the much-needed foreign exchange that the project would earn through the export of minerals if the results shall be good, and mining is embarked on. This option would also deprive the local people of Chongwe District of the much-needed employment opportunities.

Potential Environmental and social Impacts / Enhancement and Mitigation measures

Environmental impacts of the project have been identified and mitigation measures for those that are significant have been outlined. The proposed mitigation measures which will be implemented by Sino Xinyuan Mining Limited have been subdivided into environmental and socio-economic depending on the nature of the impact.

Positive Socio-Economic Impacts and Enhancement Measures

The project is anticipated to bring significant benefits to the local and national economy.

Employment Creation

The project will create **over 50 direct employment opportunities** for skilled and unskilled labor, prioritizing individuals from local communities, including women, with equal opportunities for both genders. Indirect employment will also be stimulated in related sectors like construction, manufacturing, and services.

- **Enhancement:** First priority for employment will be given to the local community; skills not available locally will be sourced from other parts of the country.

Increased Public Revenues

Implementation will boost revenue for central and local authorities through direct and indirect taxes (e.g., VAT, PAYE), levies for local planning authorities, and contributions to pension funds like NAPSA.

- **Enhancement:** The developer will ensure all due taxes are paid and that all employees contribute to a pension fund.

Capacity Building

The project's scale and adherence to health and safety standards will enhance management and planning skills within Zambia's engineering and mining sectors. Collaboration with international suppliers and local contractors will facilitate skills transfer and build local capacity.

- **Enhancement:** Locals will be employed and trained in various skills by working alongside non-local experts.

Negative Socio-Economic Impacts and Mitigation Measures

Potential negative impacts will be addressed through comprehensive mitigation strategies.

Spread of HIV/AIDS, Covid, STIs, Malaria etc.

The influx of people from other areas may increase the spread of communicable diseases.

- **Mitigation:** Workers will receive sensitization on prevention protocols for HIV/AIDS, Covid, and STIs, including provision of condoms. Malaria prevention includes providing mosquito nets for camp tents and repellents.

Change in Land Use and Loss of Agricultural Land and Fisheries

The project may lead to the loss of existing land use activities, including agricultural land and potential disturbance to stream-based fishing.

- **Mitigation:** Silt drains from overburden storage and dewatering activities will be treated and reused to prevent contamination of nearby streams. Mine operations will be strictly restricted to the licensed area.

Resettlement Impacts

There is a possibility of impacting crop fields or settlements within the mining area.

- **Mitigation:** Affected field owners will be provided with alternative land in consultation with local traditional and community leaders. The company will allow field owners to harvest all crops before commencing operations.

Loss of Livelihood due to the Project

Farming, wild fruit gathering, charcoal production, and other livelihood activities may be lost.

- **Mitigation:** Only the mining area of interest and associated sensitive facilities will be restricted from public access for safety. Alternative access routes will be created if needed, and any loss of livelihood will be compensated.

Loss of Customary Rights and Ethnicity

The mixing of workers from diverse backgrounds may lead to a loss of respect for local customs and ethnicity.

- **Mitigation:** The community's values and rights will be respected. Workers will have freedom for traditional practices, and the developer will work in harmony with local leaders to uphold traditional values and respond to community needs.

Road Safety

Increased traffic from haulage of materials during construction and operation phases poses a risk to road safety and may damage roads.

- **Mitigation:** Measures include regular road maintenance (grading, drainage, pothole repair), dust suppression (water spraying, chemicals), enforcing speed and load limits, regular vehicle maintenance, traffic management (signals, flaggers), and environmental monitoring of transportation impacts.

Increased Pressure on Public Infrastructure

Population growth due to worker influx may strain existing public amenities like schools and clinics.

- **Mitigation:** The developer will support local schools and clinics to alleviate pressure. Private schools and clinics are also anticipated to be established.

Archaeological / Historical / Cultural Sites

No known sites exist on the project site, but a "chance find" procedure is necessary.

- **Mitigation:** Any discovered artifacts or items of archaeological importance will be reported, and appropriate procedures will be followed.

Biophysical Environmental Impacts

Positive Impacts

No significant positive biophysical impacts were identified.

Negative Impacts and Mitigation Measures

Air Pollution

Dust generation from open areas, haul roads, excavation, stockpiles, and exhaust fumes from machinery, as well as minor blasting, will contribute to air pollution.

- **Mitigation:** Water sprinkling on open areas and haul roads, provision of dust masks, weekly safety talks, mobile water sprays for stockpiles, and implementation of an environmental monitoring program for airborne emissions and blasting effects.

Surface and Underground Water Pollution

Improper storage of overburden/waste rock, and washing/maintenance of mine machinery may lead to water contamination (silt, hydrocarbons).

- **Mitigation:** Installation of adequate silt trap drainages, wash-bays with impervious surfaces and containment, hydrocarbon traps in workshops and around fuel tanks, pumping pit water into settling ponds for dust suppression, environmental induction for workers, and an emergency pond for excess water.

Depletion of Groundwater Resources due to Dewatering

Increasing pit depths may change the water table level due to groundwater inflow into the pit.

- **Mitigation:** Groundwater quantity will be maintained through groundwater recharge using water from settling ponds, draining it onto areas with trees to facilitate percolation and maintain the water table.

Siltation of Water Bodies

Pumping groundwater with suspended solids and runoff from waste rock dumps/ore storage areas during heavy downpours can lead to siltation.

- **Mitigation:** Pit water will be pumped into a series of four settling ponds, ensuring only clear water is discharged. Silt will be regularly cleaned from ponds. Waste rock design will include a thick hard rock boundary, and efficient silt traps will be installed around waste rock and ore storage areas with a weir at the discharge point.

Occupational Health and Safety

Construction and operation involve high-risk activities (confined spaces, open flames, hazardous environments, working at height, heavy machinery operation).

- **Mitigation:** Strict adherence to safety measures and procedures, daily SHE awareness talks, provision of adequate PPE, mandatory safety induction for visitors, clear signage, anchorage equipment for working at heights, fire extinguishers on machinery, and an on-site clinic with a standby emergency vehicle.

Risk of Fire

Potential fire risks arise from inadequate equipment design/maintenance, poor housekeeping (flammable material accumulation), and unsafe working environments (oil spills).

- **Mitigation:** Maintain proper workplace conditions and strict housekeeping, implement robust equipment maintenance programs, install adequate firefighting equipment (extinguishers, hoses, mobile units), train employees in fire prevention and firefighting, conduct regular mock emergency drills, and enforce proper storage and handling of flammable materials.

Public Health and Safety

Reduced water quality from mining operations can lead to waterborne diseases, and stagnant water pools can increase malaria incidence.

- **Mitigation:** Proper waste management protocols, routine water quality tests on surface water bodies, enhanced water sampling and monitoring, provision of bottled or disinfected drinking water for workers, spraying stagnant water with insecticide, and providing mosquito nets and repellent. An on-site clinic will attend to infections.

Noise Pollution

Copper mining activities, including blasting and heavy machinery, generate high-frequency sound and vibrations.

- **Mitigation:** Mining equipment restricted to the mine area, monthly servicing of equipment to reduce noise, use of modern explosives with minimal noise/vibrations (effects not exceeding 1km), and provision of ear protection equipment for workers.

Vibrations Damaging Structures in Nearby Settlements

Blasting activities can create vibrations that may damage nearby structures.

- **Mitigation:** Workers will be notified of blasting schedules via sirens and alarms. Mining engineers will be involved to ensure appropriate explosives with short-range effects are used, employing geotechnical analysis to predict rock mass response and design safe pits to minimize vibrations to allowable standards. Blasting activities will be properly scheduled to minimize disturbance.

Fly Rocks Injuring Members of the Surrounding Community

Blasting activities pose a risk of flying rocks injuring nearby communities and workers.

- **Mitigation:** Fly stone danger zones will be marked, leading to evacuation of workers. The open pit will be located over 1km from settlements, and the blasting method used is unlikely to affect settlers. Sirens will be sounded clearly around blasting sites.

Hazardous Waste Generation

Development and operation will generate hazardous waste, including liquid (petroleum products, chemicals) and solid (e-waste).

- **Mitigation:** Enhanced waste segregation at source, designated hazardous waste storage areas with impermeable surfaces and bunding, collection of used oils/lubricants in sealed drums for licensed recycling, secure storage and disposal of e-waste via approved recyclers in consultation with ZEMA, handover of chemical waste to licensed handlers, and readily available spill kits with trained staff for immediate containment and clean-up.

Biodiversity Impacts

Land clearing for mining sites leads to deforestation, impacting local organisms and changing land use. Contaminated water with heavy metals can lead to biomagnification in the food chain.

- **Mitigation:** Only high mineral concentration areas within the license will be developed, preserving large trees, and clearing only access routes. The company will participate in tree planting programs. Open pits will undergo reclamation during decommissioning, with waste rock and overburden maintained for future use. Water from open pits will be pumped into settling ponds, tested for heavy metals, and treated before discharge into storm drainage ways and the Chongwe River.

Summary of Environmental Baseline study findings

The environmental baseline studies involved collection and assessment of data from a variety of parameters including among others the following: climate, air, soils, geology, topography, water, noise, and flora and fauna and the social- economic parameters included the following: demography, culture, health, education, and economic activities.

Current Environmental State:

The project area is presently characterized by a predominantly disturbed landscape, with extensive vegetation clearance evident across the site. The ground surface is largely bare, consisting of loose, dry sandy soils interspersed with occasional patches of low-lying shrubs and small bushes. Vegetative cover is minimal, and there is a notable absence of ground-level grass or organic litter, resulting in reduced soil stability. The surrounding environment comprises a flat to gently undulating terrain, with remnant vegetation limited to scattered shrubs and degraded grassland. Overall, the site reflects a degraded ecological state with diminished biodiversity and reduced natural habitat integrity, consistent with an area transitioning from natural cover to active development use.

Project Area Description

The proposed Kasisi East open-pit copper mine is located in Chongwe District, approximately 40 km east of Lusaka's Central Business District. The site is situated within the Kasisi Area and is accessible via the Great East Road and Kasisi Road. The area is rural, with agriculture as the predominant land use. The Chongwe River is about 2.09 km south of the proposed mine pit, and a dammed stream, Chalalobuka Dam, is also a significant water body in the project area.

Ecological and Biophysical Environment

The project site falls within Zambia's

agro-ecological region IIa, which is known for an annual rainfall of 800-1000mm and a growing season of 100-140 days. The area's ecology has been significantly affected by human activities, especially agriculture and infrastructure development.

- **Flora:** The vegetation is characteristic of the **Miombo woodland**, with dominant tree genera including *Brachystegia*, *Julbernardia*, and *Isoberlinia*. No rare or endangered flora species were identified in the project area.
- **Fauna:** Large mammal populations have been depleted, but smaller mammals like rodents and monkeys, along with various reptiles and amphibians, persist in fragmented habitats. Common species noted include the Blue Monkey and Nile Monitor Lizard. No rare or endangered animals were found.
- **Birds:** The bird life is typical of Miombo woodlands, with a mix of resident and migratory species. The study noted species such as the Grey Go-away Bird and the Cattle Egret. No rare or endangered bird species were observed.

Physical Environment

The physical baseline data was collected using a combination of field surveys, lab analyses, and predictive modeling.

- **Geology and Hydrogeology:** The area is underlain by Precambrian metasediments, with depths ranging from Lower Precambrian to Lower Palaeozoic. The water table is approximately 18 meters deep, with productive potable water found at depths of up to 40 meters. The groundwater at the mine site is relatively deep, ranging from 40 to 50 meters.
- **Soils:** The project area consists of **clay soils in the east and sandy soils in the south**. Soil fertility is moderate in the clay zones and lower in the sandy zones, with low nitrogen and phosphorus levels. The soil pH is mildly acidic, which is suitable for most local crops. Heavy metal concentrations, including lead, cadmium, and arsenic, are all well below international threshold values, indicating no pre-existing contamination. The sandy soils are prone to erosion, especially during the rainy season.
- **Drainage and Water Quality:** The drainage pattern flows towards the Chongwe River, which is 2.09 km south of the site. The Chalalobuka Stream has been dammed and serves as a water source for agriculture and domestic use. Water quality data was collected for surface and groundwater sources to determine their existing condition. The results for the

Chongwe River, Chalalobuka Stream, and groundwater indicate generally safe conditions, with all parameters complying with Zambian regulatory standards (ZEMA/ZABS).

Water Quality Test Results:

- ✓ **Chongwe River:** Showed a pH of 7.5 and slight elevations in turbidity (12 NTU), iron (0.18 mg/l), and total coliforms (120 CFU/100ml), though all levels are within acceptable limits.
- ✓ **Chalalobuka Stream:** Had a pH of 7.1 and marginally higher TSS (22 mg/l) and iron (0.22 mg/l), influenced by agricultural activity.
- ✓ **Underground Water:** Demonstrated exceptional quality with a pH of 7.8, negligible turbidity (1 NTU), and no fecal contamination. Heavy metals such as lead, cadmium, and arsenic were well below thresholds across all sources.
- **Air Quality and Noise:** The baseline air quality in the project area is generally good. Air quality varies seasonally, with heavy rainfall dispersing dust and smoke during the wet season, while the dry season can see reduced visibility due to haze. Major sources of air pollution are bush burning and dust from the unpaved Kasisi Mission road.

Air Quality Sampling Results:

- ✓ **Particulate Matter (PM_{2.5}):** The highest concentration recorded was 0.0325 mg/m³ at the Kasisi Road Junction in the morning, which is below the Zambian limit of 50 mg/m³.
- ✓ **Particulate Matter (PM₁₀):** The highest concentration recorded was 0.0558 mg/m³ at the Kasisi Road Junction in the morning, which is below the Zambian limit of 50 mg/m³.
- ✓ **Total Suspended Particulates (TSP):** The highest reading was 0.1203 mg/m³ at the Kasisi Road Junction.
- ✓ **Gaseous Pollutants (SO₂, NO_x, CO):** These were not detectable at any of the sampling points.

The sound levels in the project area are low, typically below 45 dBA, which is consistent with its rural setting.

- **Noise Measurements:** A Casella CEL24X Sound Level Meter was used to measure ambient noise.
 - ✓ **Average (dBA):** The highest average was 47.2 dBA at the Kasisi Road Junction.
 - ✓ **Peak (dBA):** The highest peak was 54.1 dBA, also at the Kasisi Road Junction.

All recorded noise levels were below the 55 dBA limit for residential and rural areas.

Socio-Economic and Cultural Environment

The Chongwe District has a population of 315,121 people and a high annual growth rate of approximately 7%. The project area remains predominantly rural.

- **Economic Activities:** The local economy is mainly based on small-scale agriculture, with households engaged in subsistence and semi-commercial farming. Common crops include maize, vegetables, and groundnuts. The area's proximity to Lusaka provides access to urban markets.
- **Social Services:** Kasisi has a rural health center and several schools, including Kumena Basic School and Kasisi Girls Secondary School. Access to clean water is primarily from boreholes and wells. Electricity is intermittent and limited to a few settlements.
- **Cultural Aspects:** The area is under the traditional jurisdiction of Chieftainess Nkomeshya Mukamambo II. The dominant religion is Christianity, but traditional spiritual practices are also maintained. The most significant traditional ceremony is the

Chakwela Makumbi (rain-making ceremony), held annually in October. The Kasisi Mission, established in 1905, is an important historical site in the district.

- **Land Use and Tenure:** The project site is privately owned under leasehold tenure. Land tenure in the broader Kasisi area is primarily customary, and most households lack formal land titles.

Project Lifespan

The total life of mine is estimated at approximately 5 years, based on the ore body's geometry and projected production rate. Sino Xinyuan Mining Limited will be mining copper ore and the company is yet to start any operations to do with mining 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	<p>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</p>	<p>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.</p>	
Mr. Chilumba Mulenga	Bsc. Biotechnology	<p>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.</p> <p>Participate in the assessment of project impacts on environmental components.</p> <p>Contribute to the development of mitigation measures.</p> <p>Participate in the production of reports.</p>	Ecology	

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 Overview

Sino Xinyuan Mining Company Limited, a Zambian-registered mining company, is planning to develop a new open pit copper mine within its licensed area in the Kasisi area of Chongwe District, Lusaka Province. The project site lies approximately 40 km east of Lusaka and about 20 km from Kenneth Kaunda International Airport, and is easily accessible via the Great East Road and Kasisi Road.

The proposed development involves transitioning from the company's current underground mining operations to an open pit method to extract copper ore located closer to the surface. This transition aims to improve safety, increase productivity, and enhance recovery of high-grade copper. The open pit mine will cover an area of about 5 hectares, while the overburden storage area will occupy approximately 4 hectares.

Key infrastructure and components of the project include:

- A single open pit with a depth of 45 meters and a daily production capacity of 500–800 tonnes of ore.
- An engineered overburden storage area to safely store waste rock and soil.
- Use of heavy machinery and controlled blasting for excavation.
- Ore transport to the company's existing on-site processing plant for the production of copper concentrate.

The mine will produce copper concentrate as its main product. By-products such as waste rock, overburden, and topsoil will be carefully managed and reused where possible for rehabilitation of the mined area.

The project will utilize existing infrastructure already developed for the underground mine, including access roads, power and water supply, workshops, accommodation, and a processing plant. This will reduce the need for major new construction and help minimize environmental disturbance.

Environmental protection measures will include:

- Dust control using water bowsers
- Management of surface runoff and siltation
- Proper storage and use of explosives and fuel
- Monitoring of air, water, and noise levels
- Progressive land rehabilitation using stockpiled topsoil

The project is expected to operate for about 5 years, with activities spread across preparation, construction, operation, and eventual closure. Upon closure, the site will undergo full rehabilitation to restore the land and ensure long-term environmental safety.

Sino Xinyuan Mining Company Limited is committed to complying with all environmental and mining regulations in Zambia, and will engage with stakeholders throughout the life of the project to ensure transparency and community involvement.

Non-Technical Summary Nyanja

Chidule cha Ntchito ya Mgod

Kampani ya Sino Xinyuan Mining Company Limited, yomwe idalembetsedwa ku Zambia, ikukonza zotsegula mgodi watsopano wa mkuwa m'dera lake ku Kasisi, m'chigawo cha Chongwe ku Lusaka. Malo a mgodi ali pafupi ndi ma kilomita 40 kum'mawa kwa Lusaka, ndipo pafupifupi ma kilomita 20 kuchokera pa ndege ya Kenneth Kaunda International Airport.

Mgodi watsopanowu udzakhala mtundu wa open pit (mgodi wotseguka), womwe udzabweze m'malo mwa njira yam'mbuyo ya underground (pansi pa nthaka). Izi zikuyembekezeka kuonjezera chitetezo, kuchulutsa zokolola, ndi kupeza mkuwa wambiri.

Zofunika pa ntchitoyi ndi monga:

- Kukumba mgodi wozama mamita 45.
- Kugwiritsa ntchito makina akuluakulu komanso kuphulitsa mwapang'ono-pang'ono.
- Kutenga matani 500 mpaka 800 a mkuwa tsiku lililonse.
- Mkuwa ukadzapita ku fakitale yomwe ilipo kale.

Kampaniyi idzagwiritsa ntchito zida zomwe zilipo kale za mgodi wa underground, monga misewu, magetsi, madzi, ndi malo ogwirira ntchito, kuti ichepetse kuwononga chilengedwe.

Kampaniyo yalonjeza kutsatira malamulo onse a za chilengedwe ndi migodi ku Zambia, ndipo ikupereka lonjezo loti idzagwira ntchito ndi anthu am'deralo kuti atenge nawo mbali.

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ABBREVIATIONS

Acronym	Definition
CCA	Chief Conservator of Forests
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ECZ	Environmental Council of Zambia
ZEMA	Zambia Environmental Management Agency
MLNREP	Ministry of Lands, Natural Resources and Environmental Protection
MTENR	Ministry of Tourism, Environment and Natural Resources
NGO	Non-Governmental Organization
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
ToR	Terms of Reference
ZAWA	Zambia Wildlife Authority

1.0 INTRODUCTION

1.1 Background of the Project

Sino Xinyuan Mining Company Limited is a Zambian-registered mining company, incorporated on the 10th of May 2021, and currently engaged in copper exploration and Large-scale underground mining in Chongwe District, Lusaka Province. The company operates on Lot No. 2677/M, under License No. 26238-HQ-LML within the Kasisi area, and has been extracting copper ore through underground methods under a legally granted license. The mined ore is processed using on-site beneficiation techniques, producing copper concentrate for further refining. The company's operations are based on detailed geological data and historic drilling records originally compiled by exploration teams active in the area dating back to the 1960s. These datasets have enabled Sino Xinyuan to develop a precise understanding of the Kasisi ore bodies, particularly the East and West blocks. Building on the success of its initial underground mining operations, Sino Xinyuan is now seeking to expand and optimize its mining activities by transitioning to open pit mining within the Kasisi East ore body. This shift is intended to improve ore recovery, increase daily production capacity, and reduce operational complexity.

Sino Xinyuan Mining Company Limited is proposing the development of a new open pit copper mine targeting the Kasisi East ore body, located within the company's existing license area, 26238-HQ-LML in Kasisi, Chongwe District. The proposed development marks a progression from its current underground operations to a surface mining method designed to extract ore more efficiently. The transition to open pit mining is aimed at enhancing operational safety and productivity while optimizing the recovery of high-grade copper from near-surface ore zones. Sino Xinyuan Mining Company Limited is committed to implementing this project in compliance with Zambia's environmental and mining regulations, supported by appropriate environmental management plans (EMPs), stakeholder engagement, and long-term monitoring frameworks.

1.2 Summary Description of the Project Including Project Rationale

1.2.1 Project Overview

Sino Xinyuan Mining Company Limited proposes the development of a new open pit copper mine targeting the Kasisi East ore body, located within the company's existing large-scale mining license area No. 26238-HQ-LML, in Kasisi, Chongwe District of Lusaka Province. The project site is approximately 40 km east of Lusaka's CBD and 20 km from Kenneth Kaunda International Airport (KKIA), with access via the Great East Road and Kasisi Road.

The proposed project represents a strategic transition from the company's current underground operations to a surface mining method, optimized for extracting high-grade copper from shallow ore zones. The project footprint covers approximately 8.5 hectares and includes the construction of a single open pit and a dedicated overburden storage facility.

Technical and Operational Overview

➤ Open Pit Design:

- Depth: 45 meters
- Surface boundary: 256 m × 218 m
- Floor boundary: 218 m × 128 m
- Ore thickness (avg.): 3.43 m
- Average grade: 3.72% Cu
- Estimated total ore volume: ~565,101 tonnes
- Contained copper: ~21,000 tonnes
- Daily production target: 500–800 tonnes
- Haul road gradient: 8–11%
- Bench face angle: 55–65°; berms: 5 m wide, 1 m high

➤ Overburden Storage Facility:

- Base area: 300 m × 300 m

- Top area: 200 m × 200 m
- Height: 30 meters
- Slope angle: 31°

The open pit operation will use conventional "Excavate-Load-Haul" methods, involving site clearing, topsoil stripping, controlled blasting (minimal due to shallow ore), excavation, ore haulage to the existing processing plant, and waste rock disposal. Dewatering systems and grade control practices will be implemented to ensure safety, efficiency, and ore recovery.

Product and By-products

- **Main Product:**
 - ✓ High-grade copper ore (3.72% Cu), processed at the existing on-site beneficiation plant to copper concentrate intended for smelting or further refining at off-site facilities.
- **By-products:**
 - ✓ Waste rock, overburden, and topsoil – to be managed through engineered storage and progressive rehabilitation.

Supporting Infrastructure and Inputs

The project will leverage existing infrastructure developed for underground operations, including haul roads, power supply, processing plant, workshops, water supply, accommodation, and clinics. Additional inputs required for the open pit operation include:

- Explosives (ANFO, detonators)
- Fuel, lubricants, and drill consumables
- Concrete, steel, liners, and dewatering equipment
- PPE and safety equipment

Environmental and Safety Considerations

Key environmental controls include dust suppression, stormwater management, progressive rehabilitation, noise and vibration controls, and comprehensive monitoring (air, water, noise, biodiversity). Health and safety will be supported through structured training, PPE use, safety audits, and emergency preparedness protocols.

Project Phases and Timeline

- **Preparation Phase:** Obtain approvals and initial procurement (July– September 2025)
- **Development Phase:** Earthworks, access road development, berms, drainage systems, and pit development (October–December 2025)
- **Operation Phase:** Mining, haulage, grade control, processing, and environmental monitoring (Early 2026 onward)
- **Closure Phase:** Pit closure, equipment removal, haul road dismantling, waste dump stabilization, revegetation, and long-term monitoring

The total life of mine is estimated at approximately **5 years**, based on the ore body’s geometry and projected production rate.

1.2.2 Project rationale

The worldwide demand for copper has been increasing the past decade and, Zambia has huge quantities of copper mineral ore. Therefore, the high demand of copper in the world today requires substantial utilization of resources (i.e. copper ore) and this is the major driving force for implementing this project. The project will empower the local community once commenced through:

- Providing additional jobs, directly through employment
- Supply of copper raw materials (Copper Ore)
- Increasing production capacity for the company
- Social corporate responsibility
- Capacity building

1.3 Objectives of the Project

The main objective of the proposed project involves the development and operation of a copper open pit mine. The Copper ore when mined will be processed at the existing processing facility.

The scoping report has been prepared on behalf of Sino Xinyuan Mining Company Limited. They represent the scope of service to be followed by all project stakeholders throughout the project phases and the views gathered.

Specific objectives:

- To describe the nature and activities of the proposed copper mining activities.
- To identify possible environmental and social impacts and suggest corrective measures for guiding the project
- To ensure that the operations are done in a safe and environmentally conscious manner
- To employ people with the priority being given to the local community

1.4 Brief Description of the Location

The proposed Kasisi East open pit copper mine is located in Chongwe District, approximately 40 km east of Lusaka Central Business District (CBD) and about 20 km from Kenneth Kaunda International Airport (KKIA). The project site lies within the Kasisi Area under the Large-scale mining license (No. 26238-HQ-LML). The project site is accessible via the Great East Road and Kasisi Road, with the final 2 km stretch branching off from a gravel road near Kasisi Mission. The Chongwe River lies approximately 2.09km south of the proposed pit, indicating the need for hydrological and environmental safeguards. The area is characterized by mixed-use rural development, with agricultural activities being predominant. The project will be implemented with attention to land-use coordination, stakeholder engagement, and environmental compliance.

The surrounding landscape includes:

- Kasenga Farm Block to the west and north,
- Kasenga B Cemetery 1.6 km north,
- Kasisi Area to the south.

Key nearby developments include:

- Kumena Basic School (2.45 km north),
- CMML Church (2.5 km northwest),
- Farmhouses, sheds, cultivated fields, and center pivots used by Kasisi Farmers Trust within the proposed site boundary.

Table 4 Geographic Coordinates of the proposed project

Coordinates (WGS 84, Zone 35S)	
Latitude	Longitude
15°13'11.99"S	28°33'23.00"E
15°13'11.95"S	28°33'28.90"E
15°13'20.70"S	28°33'29.54"E
15°13'20.85"S	28°33'23.68"E

1.5 Particulars of Shareholders/Directors

The tables below present the shareholders and directors of Sino Xinyuan Mining Limited.

Table 5 Shareholders and Directors

Present forenames and surnames	Nationality	Identity Type	Identity Number	Director / Partner	Secretary	Shareholder / Member	Shares (%)	Actual Shares Amount
Xichun Zheng	CHINA	Passport	E18469815	Yes		Yes	30%	4,500
Haibo Zheng	CHINA	Passport	EH1404096	Yes		Yes	70%	10,500
Xuejiao Zeng	CHINA	Passport	E34042825	Yes	Yes	-	-	-

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

Name: Madelyn deng,

Designation: Business development manager

Contact Number: +260962393691

Physical Address: Chalalobuka, Kasisi Road, Mission Area, Chongwe, Lusaka Province, Zambia.

Email Address: madelyndeng@163.com

1.7 Track Record/Previous Experience

Sino Xinyuan Mining Company Limited has established a strong operational track record since its incorporation on 10th May 2021. The company is currently engaged in large-scale underground copper mining within the Kasisi area under License No. 26238-HQ-LML. It has successfully developed and maintained key infrastructure including an on-site copper ore processing plant, access roads, workshops, and worker accommodation facilities. Through its ongoing operations, Sino Xinyuan has demonstrated compliance with environmental and safety regulations, maintained consistent production outputs, and contributed to local employment and economic development in Chongwe District. This experience positions the company well to efficiently implement and manage the proposed open pit mining project.

1.8 Total Project Cost/Investment

The project investment cost is estimated at \$9 million dollars.

1.9 Proposed Project Implementation Date

The lifespan of the Mine/project is expected to be 5 years

Table 6 Project Schedule

Activity	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026
Preparation							
Obtain approvals and Procurement of construction materials							
Development							
Site preparation and mobilization of equipment; initial groundwork begins.							
Development of key components, including the pit, and overburden storage area							
Commissioning of the plant and initial testing. processing operations commence.							

2.0 POLICY, INSTITUTIONAL AND ORGANISATIONAL FRAMEWORK

2.1 Policy Framework

2.1.1 National Environmental Policy

The Government has developed a National Policy on Environment to avoid conflict of interest, harmonise sectoral strategies, and rationalise 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 recognises 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: Sino Xinyuan Mining Company Limited will strive to manage its environment in line with the National Environmental Policy as evidenced by the development of the company's environmental policy and preparation of documents such as EIS.

Compliance: Sino Xinyuan Mining Company Limited will adhere to the national environmental policy in the management of the environment.

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 Open pit Mine for Copper project by Sino Xinyuan Mining Company Limited. One specific environmental policy objective is to reduce the danger of ecological damage arising from mining operations as well as damage to 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 provides 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: The proposed Open pit Mine for Copper project is a mining related project, hence falls within the confines of the Mining Policy.

Compliance: Sino Xinyuan Mining Company Limited will ensure that all the new developments are undertaken in line with the Mining Policy. Sino Xinyuan Mining Company Limited will conduct the proposed development in consultation with the ministry of mines and all the relevant stakeholders under the mining policy.

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 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: Sino Xinyuan Mining Company Limited Proposed Open pit Mine for Copper project may interact with the water resources that are within the spheres of the National Water Policy.

Compliance: Sino Xinyuan Mining Company Limited will continue to engage with the Department of Water Resource Development and the Water Resources Management Authority (WARMA) to ensure that the National Water policy is adhered to during the implementation of this project.

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 minimize 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: Section 29 subsection (1) of the Act states that “A person shall not undertake any project that may have an effect on the environment without the written approval of the Agency, and except under any conditions imposed in that approval.” Section 30 subsection 2 (a) of the Act states that “the categories of projects that are considered to have an effect on the environment for subsection (1) of section twenty-nine and are required to conduct environmental impact assessments”. This ESIA was being done in compliance with the EMA read together with the EIA Regulations.

Compliance: Sino Xinyuan Mining Company Limited has appointed an independent consultant to undertake the ESIA to comply with the EMA Act before the implementation of the proposed project.

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 (Amendment) Act, 2022).

Relevant mining subsidiary legislation was developed in the 1990s to ensure that environmental management practices were carried out within industry for old, existing and new projects as part of the old Mines and Minerals Act (repealed by the MMDA, 2022).

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: An Open pit Mine for Copper project is directly relevant to the Mines and Minerals Development Act (MMDA) No. 29, 2022 because the Act requires a mineral processing license for such operations, ensuring compliance with regulatory, environmental, and safety standards. Additionally, the plant must adhere to subsidiary legislation like SI No. 29 of 1997 (mandating EIAs and audits) and SI No. 102 of 1998 (governing the Environmental Protection Fund), which enforce pollution control, financial assurances, and rehabilitation measures. The MMDA and its related regulations ensure that the plant operates within legal frameworks for licensing, environmental management, and fiscal obligations.

Compliance: Sino Xinyuan Mining Company Limited will ensure that it implements the project in line with the requirements of the Mining and Minerals Development Act by ensuring that environmental assessment is thoroughly conducted before project implementation.

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: Sino Xinyuan Mining Company Limited subjects to all its works through the process for fitness certification. All workers will be subjected to mandatory examinations 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: Section 72 (3) states that a person holding a permit or a license under the Mines and Minerals Development Act, 2008 who requires the use of water for mining purposes, shall make an application to the Director of Mines, setting out the volume of water required, the nature of the proposed use and such other information as may be prescribed. Section 72 (4) states that the Director of Mines shall cause an inquiry to be made into the merits of the application, made under subsection (3) and shall thereafter forward the application with comments and recommendations to the Director-General, catchment council, sub catchment council or water users association for consideration. Section 150 (v) provides for charges for any dewatering activities for any mining and industrial activities.

Compliance: This project is within the Chalalobuka Stream and Chongwe River water bodies catchment. The Act provides for the conservation and protection of such waterbody systems. Sino

Xinyuan Mining Company Limited will ensure that WARMA and the Department of Water Resource Development are involved during the project planning and implementation stages as well as for all the water needs of the company.

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

This Act is to provide for the establishment of the Agricultural Lands Board; to prescribe the composition and membership thereof; to prescribe its powers and functions; to provide for tenant farming schemes; and to provide for matters incidental to or connected with the foregoing

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.

Compliance: If the project is not appropriately managed it has a potential impact on some agricultural areas in the area. Sino Xinyuan Mining Company Limited, with 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: Section 6 (3) of the Act mandates that any discharge between water types whether subsoil, surface, storm, rainwater, sewage, or wastewater must only occur with written permission or under the direction of the Local Authority. It specifically requires that natural water discharges be released directly into the open air over a controlled, elevated area, preventing mixing with sewage or wastewater. If these regulations are not properly followed in the project, it could lead to improper handling of water materials, creating potential public health hazards.

Compliance: Sino Xinyuan Mining Company Limited will continue to work with all relevant stakeholders to ensure that public health hazards related to the processing operations are identified early and mitigated.

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 Chongwe district under the auspices of 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. Sino Xinyuan Mining Company 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

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: Section 3 of the Lands Acts provides that all powers over land in Zambia is vested in the president who acts on behalf of the Zambians and the president may alienate the land vested in him to any Zambian and non-Zambian individuals or companies who qualifies.

Section 4 also provides that the President shall not alienate any land situated in a district or an area where land is held under customary tenure without taking in consideration the local customs of the area, consulting the Chief and local authorities. For any project development, Land ownership and compensation are critical items.

Compliance: Sino Xinyuan Mining Company Limited will continue adhering to the provisions of the acts on land management.

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: The Act is relevant for known and unknown relics and objects of aesthetic, historical, pre-historical, archaeological or scientific interest which may be found within the Project area. Section 1 of the Act provides for the establishment of the Commission and Section 8 provides for the functions of the NHCC that includes preservation of archaeological artefacts and other national heritages.

Compliance: Sino Xinyuan Mining Company Limited will work closely with NHCC in implementing the proposed project.

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: Part II of the Forest Act establishes the Forestry Department within the government system as well as its functions. Part III provides for the management and development of the forests – National, Local Forests and Botanical reserves.

Compliance: The project implementation will be implemented in a way to protect and preserve the vegetation in the nearby areas to encourage the development of forests where possible.

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: Section 4 of the act establishes the Occupational Health and Safety Institute while Section 6 provides for the functions of the institute that include conducting medical examinations for occupational health and safety purposes in workplaces. Section 11 under Part III states that an employer of ten or more persons at any workplace shall establish a health and safety committee. The project will employ some persons to perform these functions during all project stages.

Compliance: The project will protect all workers at the project site from the various health and safety risks associated with the activities. Sino Xinyuan Mining Company Limited will establish a safety and health system on site in line with the act.

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: Section 41 under Part V of the Act provides that if an accident to a worker arising out of and during his employment happens after the date of commencement and results in such worker's disablement or death, he, or if he dies, his dependants, shall become entitled to compensation in accordance with the provisions of this Act.

Compliance: The project will employ some persons to perform some functions during all project stages. The project will protect all workers at the project site from the various health and safety risks associated with the activities.

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: Part III of the Act provides for the employment relationship subdivided in divisions – contract of employment, minimum employment benefits, suspension/termination of employment, employment of expatriates and skills advisory committee. The project will employ some persons to perform some functions during all project stages. These employees will need to be protected in line with the provisions of the Act.

Compliance: Sino Xinyuan Mining Company Limited will ensure that it follows all the necessary procedures required for employment.

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: Part II provides for the classification of the roads system in Zambia. Part III provides for construction and maintenance of the roads system in Zambia. The Developer may require upgrading some roads for easier access to the proposed project site.

Compliance: Sino Xinyuan Mining Company Limited will ensure that all the roads work in the area is done in line with the Act.

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: The Open pit Mine for Copper project at Sino Xinyuan Mining Company Limited, The Project Area is served by Great East Road (T4) Road that happen to be a busy road. Therefore, road safety is of paramount importance to the safety and wellbeing of other road users.

Compliance thereof: All haulage vehicles to the site, during both the construction and operational phases, as well as transport ferrying workers to and from the Mine will comply with minimum speed limits to ensure the safety and wellbeing of other road users.

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 Aquaculture Development Fund; repeal and replace the Fisheries Act, 1974; and provide for matters connected with, or incidental to, the foregoing

Relevance: The Act in its entirety provides for promotion, 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 Aquaculture Development Fund.

Compliance: The proposed project might have an influence on the fisheries management directly or indirectly. Sino Xinyuan Mining Company Limited will ensure that the company manages its operations in such a manner that does not affect the fisheries or fish breeding areas.

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: Part II of the act establishes the National Water and Sanitation Council (NWASCO) tasked with the responsibility of regulating the water and Sanitation sector. Section 11 provides for the licensing of the utilities and services provider in the water and sanitation sector. The proponent will need to provide water and sanitation facilities to the workers at the proposed development.

Compliance: The developer will ensure that the Act is adhered to by providing appropriate and adequate sanitation services to the workers while working together with the local authorities.

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: Section 4 of the Act provides that any person who erects or establishes a power generation station will do so in line with the requirements of the Act. Sino Xinyuan Mining Company Limited will need electricity for the proposed project to run.

Compliance: The developer will ensure that all the electricity needs are done in line with the Act.

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. Sino Xinyuan Mining Company Limited will need to produce its own electricity to ensure smooth operations using generators.

Compliance: Sino Xinyuan Mining Company Limited will operate the onsite generators and handle fuels in line with the Act.

2.2.21 The Ionising Radiation Protection Act

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: Part II of the Act establishes the Radiation Protection Authority (RPA). RPA is a statutory Body in the Ministry of Health (MoH) established by the Government of the Republic of Zambia through an act of parliament No. 16 of 2005. Its main functions and powers are to provide for the protection of the public, patient and environment from hazards arising from the use of devices or materials capable of producing ionising radiation. Part IV provides for the application and issuance of the licenses by RPA to various institution that handle radiation and related substances.

Compliance: In an event that Sino Xinyuan Mining Company Limited used process measurement instruments that are sources of ionizing radiation, the company will ensure that such as registered RPA.

2.2.22 Chiefs Act

This is an Act to make provision for the recognition, appointment and functions of Chiefs and Deputy Chiefs, for the exclusion of former Chiefs and Deputy Chiefs from specified areas in the interests of public order, for the appointment and functions of Chief's Retainers and for matters incidental to or connected with the foregoing (Chiefs Act CAP 287, n.d.).

Relevance: The chief has customary authority over the land of the project area as provided for under Section 4(a) of the Act which states "area; about a Chief, means the area in Zambia within which recognition is accorded to the Chief under this Act".

Compliance: The proposed project is under the traditional authority of Chieftainess Nkomeshya Mukamambo II.

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 led 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: This Convention applies directly to the proposed project by Sino Xinyuan Mining Company Limited in that the area is predominantly surrounded by water bodies.

Compliance thereof: Sino Xinyuan Mining Company Limited will comply with this convention by ensuring that all effluent from the leaching plant operations meets the ZEMA stipulated standards and by managing, as well as preventing siltation and hydrocarbon leaks in the ground or surface waters in these two surface water bodies.

2.4.2 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: Some activities associated with the proposed project at Sino Xinyuan Mining Company Limited will take place on land that is relatively virgin. This is likely to result in loss of habitat for some species of fauna, or loss of vegetation cover. Thus, site clearing and excavation activities are expected to have a certain degree of impact on the diversity of fauna and flora species within the area.

Compliance thereof: Sino Xinyuan Mining Company Limited will comply with this Convention by limiting site clearing and excavation activities during project implementation to areas earmarked for such activities. Further, all excavated topsoil will be heaped at the overburden dump that will be progressively re-vegetated.

2.4.3 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: During the copper processing operation, emissions (greenhouse gas, e.g. CO₂, CO, SO₂) will be produced which has the potential to contribute to climate change.

Compliance thereof:

Sound and well-maintained vehicles and machinery will be used to transport materials to the site during both the construction and operational phases of the proposed project. This will greatly minimize the risk of carbon monoxide and carbon dioxide emissions to the atmosphere.

3.0 PROJECT DESCRIPTION

3.1 Location

The proposed Kasisi East open pit copper mine is located in Chongwe District, approximately 40 km east of Lusaka Central Business District (CBD) and about 20 km from Kenneth Kaunda International Airport (KKIA). The project site lies within the Kasisi Area under the Large-scale mining license (No. 26238-HQ-LML). The project site is accessible via the Great East Road and Kasisi Road, with the final 2 km stretch branching off from a gravel road near Kasisi Mission. The Chongwe River lies approximately 2.09km south of the proposed pit, indicating the need for hydrological and environmental safeguards. The area is characterized by mixed-use rural development, with agricultural activities being predominant. The project will be implemented with attention to land-use coordination, stakeholder engagement, and environmental compliance.

The surrounding landscape includes:

- Kasenga Farm Block to the west and north,
- Kasenga B Cemetery 1.6 km north,
- Kasisi Area to the south.

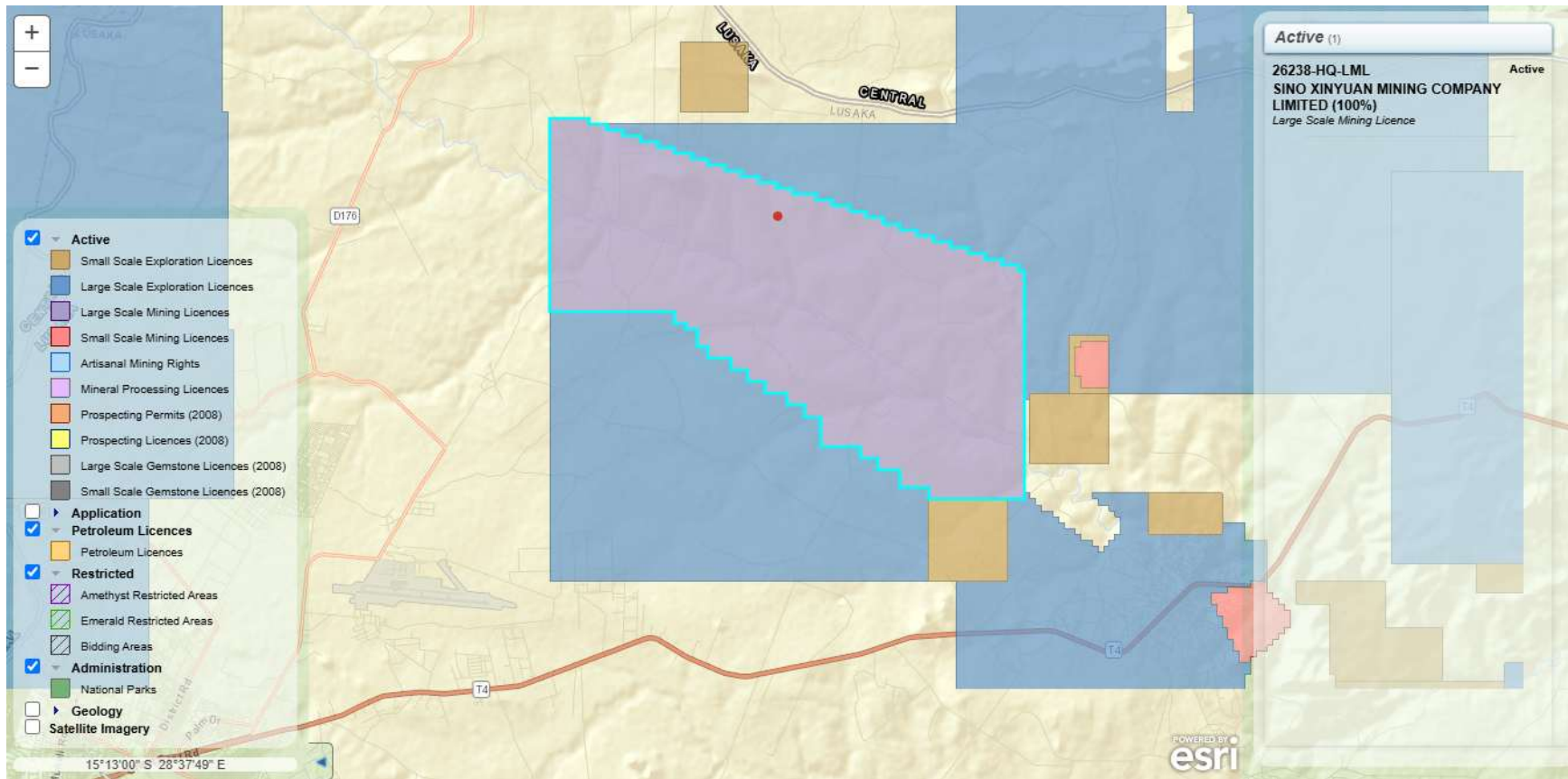
Key nearby developments include:

- Kumena Basic School (2.45 km north),
- CMML Church (2.5 km northwest),
- Farmhouses, sheds, cultivated fields, and center pivots used by Kasisi Farmers Trust within the proposed site boundary.

Table 7: Geographic Coordinates of the proposed project

Coordinates (WGS 84, Zone 35S)	
Latitude	Longitude
15°13'11.99"S	28°33'23.00"E
15°13'11.95"S	28°33'28.90"E
15°13'20.70"S	28°33'29.54"E
15°13'20.85"S	28°33'23.68"E

Figure 1 Project site Under the License Area (26238-HQ-LML)



NB: Project site in red dot Under the License Area (26238-HQ-LML)

Figure 2 Proposed Project Area



3.2 Nature of the Project

3.2.1 Project Overview

Sino Xinyuan Mining Company Limited is proposing the development of a new open pit copper mine targeting the Kasisi East ore body, located within the company's existing license area, 26238-HQ-LML in Kasisi, Chongwe District. The proposed development marks a progression from its current underground operations to a surface mining method designed to extract ore more efficiently. The transition to open pit mining is aimed at enhancing operational safety and productivity while optimizing the recovery of high-grade copper from near-surface ore zones. Sino Xinyuan Mining Company Limited is committed to implementing this project in compliance with Zambia's environmental and mining regulations, supported by appropriate environmental management plans (EMPs), stakeholder engagement, and long-term monitoring frameworks.

The Components to be put up at the proposed Open pit Mine project for copper will comprise of the following:

- Single Pit (1)
- Overburden Storage area

The proposed Open pit Copper Mine by Sino Xinyuan Mining Company Limited, will sit on Approximately 5 Ha under the Large-Scale Mining License area and the Overburden Storage area on about 4 Ha. Proposed project pit to be put up is expected to have the following design features:

Open Pit Design Features:

- Pit depth: 45 m
- Surface boundary: 256 m (length) × 218 m (width) = 45,338 m²
- Floor boundary: 218 m × 128 m = 14,764 m²
- Daily production target: 500–800 tonnes of ore
- Haul road gradient: 8–11%, turning radius: 15 m
- Safety berms: 5 m wide, 1 m high
- Bench face angles: 55–65°; hanging wall angles: 40–50°

Overburden Storage Area Features:

- square size with floor area 300*300 and top area 200*200, height 30 meters
- slope angle of this dump will be 31°

Total Area Coverage for All Infrastructures is about 85,338 square meters or 8.5338 Ha.

Mining Operation Method

The proposed mining operation will employ an **Open Pit Mining Method**, specifically a **single-pit design**, to extract copper ore from the Kasisi East ore body. This method has been selected due to the shallow depth of the ore, high ore grade, and the geometry of the deposit which favors surface mining over underground approaches. Open pit mining is more cost-effective for shallow, tabular or massive ore bodies and provides better access, safer working conditions, and greater operational flexibility.

Key Pit Design Parameters

Table 8 Key Pit Design Parameters

Parameter	Value
Pit Depth	45 meters
Surface Dimensions	256 m (L) × 218 m (W)
Floor Dimensions	218 m × 128 m
Ore Body Thickness (avg.)	3.43 meters
Average Ore Grade	3.72% Cu
Total Ore Volume	~565,101 tonnes
Estimated Contained Copper	~21,000 tonnes
Haul Road Gradient	8–11%
Turning Radius	15 meters
Bench Face Angle	55–65°
Safety Berms	5 m wide, 1 m high

Open Pit Mining Operation Process

- **Site Preparation**
 - Clearing of vegetation and stripping of topsoil for stockpiling and future rehabilitation.
 - Fencing the perimeter for safety.
 - Construction of haul roads and pit access ramps.
 - Installation of pit drainage and dewatering systems.
 - Earthworks to shape berms and benches.

- **Drilling and Blasting**

- Controlled drilling of blast holes using rotary drills along ore zones.
- Placement of explosive materials (ANFO) in designated holes.
- Sequential blasting of rock to fragment the ore and waste material.
- Adherence to safety protocols to minimize vibration and flyrock.

NB: the blasting will be minimal as the ore material is near the surface about 10 m.

- **Excavation and Haulage**

- Front-end loaders or hydraulic excavators will load fragmented ore and waste into dump trucks.
- Ore is transported to the **existing processing plant**, while waste is hauled to designated **waste rock dumps**.
- Haulage routes will be designed for optimal efficiency and minimum fuel consumption.

- **Grade Control**

- Sampling and in-pit assays will be performed to distinguish ore from waste.
- A grade control geologist will guide shovel operators to minimize ore loss and dilution.

- **Dewatering**

- Submersible pumps and boreholes will manage groundwater inflow.
- Settling ponds and lined drainage systems will be used to contain and treat pit water.

Material Handling

- **Ore Handling:** Crushed ore is conveyed from the ROM pad to the existing beneficiation facility for further processing into copper concentrate.
- **Waste Rock Management:** Waste material is transported to engineered dumps located at safe distances from the pit. Dumps are compacted and shaped with berms to prevent erosion and facilitate future rehabilitation.
- **Topsoil Management:** Stripped topsoil is stored separately from overburden and preserved for use in final pit rehabilitation.

Safety and Operational Controls

- Highwall monitoring to detect ground movement.
- Use of safety berms at bench edges.
- Speed limits and traffic management within the pit.
- Personal protective equipment (PPE) and mandatory safety training.
- Blasting notifications and exclusion zones enforced before each blast.

Environmental Considerations

- Dust suppression using water bowsers on haul roads.
- Runoff management through channeling and sedimentation ponds.
- Progressive rehabilitation of waste dumps and disturbed areas.
- Monitoring of air, water, and noise quality as per ZEMA guidelines.

Equipment Summary

Table 9 Equipment to be utilised for the mining operations

Equipment	Purpose
Hydraulic Excavators	Excavation of blasted material
Dump Trucks (30–50 tonnes)	Ore and waste transportation
Rotary Drills	Blast hole drilling
Bulldozers & Graders	Road and dump maintenance
Dewatering Pumps	Groundwater control
Water Bowsers	Dust suppression

Life of Mine (initial estimate is 5 years): Based on ore body geometry and production rate, expected to support several years of operations before depletion.

Production capacity

- Estimated ore volume: 565,101 tonnes
- Estimated contained copper metal: 21,000 tonnes
- Daily production target: 500–800 tonnes of ore

3.2.2 Raw materials

The successful implementation and operation of the proposed open pit copper mine at Kasisi East by Sino Xinyuan Mining Company Limited will require the mobilization and utilization of various raw materials. These materials are primarily intended to support the development of new surface mining components. It is important to note that the proponent already operates an underground mining facility within the same license area, and thus possesses substantial supporting infrastructure such as access roads, Processing plant, accommodation camps, service workshops, power connections, and water supply systems. As such, the raw material requirements are focused primarily on surface infrastructure establishment and mining operations specific to the open pit development.

The following are the key raw materials required:

Explosives and Initiation Systems

- ANFO (Ammonium Nitrate Fuel Oil): Primary blasting agent used for fragmenting hard rock in the pit.
- Detonators and detonating cords: Essential for controlled initiation of blasts.
- Boosters: Used to ensure reliable detonation of the ANFO.

Fuel and Lubricants

- Diesel fuel: Required in large quantities to operate heavy equipment (excavators, dump trucks, bulldozers, graders).
- Hydraulic fluids and engine oils: For lubrication and maintenance of mining and earth-moving machinery.
- Greases and specialty lubricants: Used to reduce equipment wear and extend service life.

Drilling and Blasting Accessories

- Drill rods and bits: Consumables for rotary drilling during blast hole preparation.
- Cement plugs and stemming materials: Used to confine explosive energy during blasting.

Construction and Earthworks Materials

- Steel and structural materials: For reinforcing pit perimeter fencing and maintenance of haul road edges and berms.
- Concrete and cement: Limited quantities required for drainage infrastructure, settling pond lining, and foundation work for dewatering pump installations.
- Geotextiles and liners: For lining drainage channels and settling ponds to prevent contamination.

Water

- Industrial-grade water: For dust suppression on haul roads and during earthworks.
- Potable water: For use in site offices and worker welfare facilities.

Electrical and Dewatering Materials

- Submersible and surface pumps: Already partially in use but additional units may be required to handle new pit inflows.
- Pipes, hoses, and fittings: For water management and dewatering systems.
- Cables and electrical accessories: For powering pumps and lighting as needed within the pit.

Consumables and Safety Materials

- Personal protective equipment (PPE): Helmets, gloves, boots, high-visibility clothing, and respiratory protection.
- Safety signage and fencing materials: For demarcation and hazard control during blasting and excavation activities.

Integration with Existing Infrastructure

Sino Xinyuan Mining Company Limited will leverage its existing infrastructure established for the underground mine to support the new open pit operations. These facilities include:

- Copper ore processing plant (already operational and capable of processing additional ore from the open pit)
- Access roads and internal transportation routes
- Site offices, staff accommodation, and ablution facilities
- Water abstraction points and supply networks
- Power supply (grid and standby generators)
- Mechanical workshops and equipment yards

3.2.3 Product and by-Products

Main Product

Copper Ore and Copper Concentrate

The primary product of the proposed open pit mining operation is copper ore. After mining, the ore will be transported to Sino Xinyuan Mining's existing on-site processing plant, where it will be processed to produce copper concentrate.

Key characteristics of the main product:

- Average ore grade: 3.72% Cu
- Estimated total ore volume: ~565,101 tonnes over the life of mine
- Estimated contained copper: ~21,000 tonnes
- Product form: Copper concentrate, suitable for smelting and refining by downstream processors

This concentrate will be the main revenue-generating product and is intended for sale to off-site smelters or other copper processing plant into refined copper.

By-Products

Waste Rock

- **Description:** Rock material that does not contain economically recoverable copper and is removed during pit development.
- **Handling:** Transported and deposited in engineered waste rock dumps within the designated storage area.
- **Potential use:** Some waste rock may be used internally for haul road maintenance, berm construction, and reclamation works.

Topsoil

- **Description:** Surface soil layer stripped during initial site preparation.
- **Handling:** Stored separately in dedicated topsoil stockpiles for future use in rehabilitation and revegetation of disturbed areas.

Overburden

- **Description:** Layers of soil and weathered rock that overlie the ore body.
- **Handling:** Stored in the overburden storage facility
- **Potential use:** Reused during progressive rehabilitation to shape landforms and support vegetation establishment.

3.2.4 Technology and Process

Mining activities will involve the Conventional Open Pit Excavate-Load-Haul Methods:

- **Excavation:** Excavation will involve the removal of overburden and ore from the open pit using heavy machinery such as excavators and bulldozers as well as blasting activities. These machines will dig into the earth, exposing the copper-bearing ore deposits.
- **Loading:** Once the ore is exposed, it will be loaded onto haulage trucks using front-end loaders or excavators. These loading vehicles efficiently gather the ore and transfer it to the haulage trucks for transportation to the ore stockpile or storage area.
- **Haulage:** Large haulage trucks will transport the ore from the open pit to the ore stockpile or storage area, which will be ready for processing at the existing processing plant.

3.2.5 Schedule and Lifetime of the Project

The lifespan of the Mine/project is expected to be 5 years

Table 10 Project Schedule

Activity	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026
Preparation							
Obtain approvals and Procurement of construction materials							
Development							
Site preparation and mobilization of equipment; initial groundwork begins.							
Development of key components, including the pit, and overburden storage area							
Commissioning of the plant and initial testing. processing operations commence.							

3.3 Main Activities

Basically, the proposed project will essentially have three phases of project cycle presented below.

3.3.1 Preparation phase

Activities in will include the following:

- Acquiring relevant papers from the council
- Environmental Impact assessments which is in progress
- Getting approvals from ZEMA
- Delivery of the construction materials on site
- Clearing of the site
- Recruitment and training of staff to the project tasks
- Removal of topsoil and any vegetation
- Marking the site for various Open pit mine design features

3.3.2 Construction Phase

Generally, construction activities included the following:

- Clearing of vegetation and stripping of topsoil for stockpiling and future rehabilitation.
- Fencing the perimeter for safety.
- Construction of haul roads and pit access ramps.
- Installation of pit drainage and dewatering systems.
- Earthworks to shape berms and benches.
- Construction of the overburden storage area and silt drains around the area

3.3.3 Operational Phase

The Open pit mine will consist of the following activities:

The Open pit mine will consist of the following activities:

- Drilling and Blasting of Ore and Waste Rock
- Excavation and Haulage of Ore to ROM Pad
- Haulage of Waste Rock to Dumps

- Grade Control and Pit Wall Monitoring
- Pit Dewatering Operations
- Ore Crushing and Conveyance to Existing Processing Plant
- Ongoing Environmental Monitoring (air, water, noise, dust, biodiversity)
- Maintenance of Pit Infrastructure and Haul Roads
- Fleet Management and Equipment Servicing
- Use of Existing Support Infrastructure (workshops, clinics, accommodation, etc.)
- Waste Management (hazardous and non-hazardous)
- Health, Safety, and Environmental (HSE) Oversight

3.3.4 Decommissioning and Closure Phase

The decommissioning and closure phase of mining activities shall include the following:

- Final Backfilling (if planned) or Safe Closure of Pit
- Removal of Temporary Structures and Equipment
- Dismantling and Rehabilitation of Haul Roads
- Covering and Stabilization of Waste Rock Dumps
- Revegetation using Stockpiled Topsoil
- Water Quality Management and Long-Term Monitoring
- Slope Stabilization and Safety Berm Reinforcement
- Installation of Long-term Drainage and Sediment Control Measures
- Demobilisation of Equipment
- Post-closure Land Use Planning in Consultation with Stakeholders
- Socio-economic Transition Support for Affected Communities

4.0 PROJECT ALTERNATIVES

4.1 Identification of alternatives

4.1.1 Products/Services

Sino Xinyuan Mining Limited could provide other alternative Products/Services such as

- Supplying of copper ore
- Copper ore Mining
- Copper ore Processing

4.1.2 Site Alternatives

Most of the potential areas in Zambia are under mining activities hence the choice of where to conduct mining is largely determined by availability of mineral resources and the license by the Ministry of Mines and Minerals Development. Therefore, there was no option for the site.

4.1.3 The Mining method alternatives

The first option which was selected was the development of an open pit mine for extraction of copper which will involve the removal the overburden, and cleaning of the ore to obtain copper.

The second option was the use of the underground method which involves the digging of tunnels in order to access the veins and mine the copper.

Preferred option and reason: The first option was selected because surface mining, is more advantageous than underground mining in terms of ore recovery, operational flexibility, productivity, safety, and cost. And was seen to be the most feasible due to the mineral being mined and the costs involved in the establishment of an underground mine.

4.1.4 Mining technology alternatives

The proposed project will involve the use of surface mining which will have technology alternatives, the first option will be: site preparation, overburden drilling and blasting, loading and hauling overburden (waste), drilling and blasting the deposit, loading and hauling the ore, and reclaiming the site.

The second option is quarrying which would involve fewer benches with most of the material extracted being marketable, however this would not apply to the ore deposit being target, since this technology is applied to stone aggregates.

The third option was dredging, in which a suction device (an agitator and a slurry pump) or other mechanical devices are mounted on a floating barge to dig sand, gravel, or other unconsolidated

materials under the water and transport them to land. As the material in a location is exhausted, the dredge moves forward, often constructing and carrying its own lake with it to new ground.

The forth option was Hydraulic mining which uses water power to fracture and transport a bench of Earth or gravel for further processing. Hydraulic mining is used for placer deposits of gold, tin, and other metals.

Preferred option and reason: The first alternative was selected since the mineral being targeted will require that more benches and that the overburden is removed and with the plans of future reclamation of the site.

4.1.5 Raw materials Alternatives

The first choice of the raw materials included the following: equipment's (excavators, loaders, and haulage trucks).

The second choice was manual methods involving highly intensive labour involving rock breaking with picks, use of shovels and wheelbarrows.

Preferred option and reason: The first choice was selected because it is efficient compared to the second option which will take too long and pose more threat to a lot of workers who would be required to manually break the rocks.

4.1.6 Water Source Alternatives

The first option which was considered was sourcing the wash water from the existing boreholes which will be very minimal whilst utilizing bottled water for drinking and the second option was the use of piped water.

Preferred option and reason: The best reason which was selected was the use the borehole and bottled water for drinking. The nature of the project is not viable to source piped water.

4.1.7 Energy Source Alternatives

The first alternative was the use of generators to facilitate lighting, and other machinery requiring energy, this is recommended for remote locations.

The second option was the use of electricity provided by ZESCO, which was not possible because of the remoteness of the project location from the grid line.

Preferred option and reason: The first option was selected because the proposed site is located in a remote location and the use of ZESCO power supply proved to be expensive.

4.1.8 Waste Management Alternatives

The first option was the disposal of solid waste at the designated existing dump site for the current operating Mine. The first option was the best option considering that it is environmentally sustainable.

Preferred option and reason: The first option was the best option considering that it is environmentally sustainable. Most of the waste that shall be generated shall be biodegradable waste.

4.1.9 Sanitary Waste Alternatives

The first option was the use of portable toilets. The first option of using portable toilets was selected considering the nature of operations. The second option was the use of soak ways and septic tank, and the second option was the use of pit latrines.

Preferred option and reason: The first option of using portable toilets was selected considering the nature of operations.

4.1.10 No Project Option

The “No Project Option” would negatively affect the development of the mineral resource and hence deprive the country of the much-needed foreign exchange that the project would earn through the export of minerals if the results shall be good, and mining is embarked on. This option would also deprive the local people of Chongwe District of the much-needed employment opportunities.

4.2 Analysis of each of the Identified Alternatives

4.2.1 Product/Service

There is readily available copper ore at Kasisi East Ore Body. Therefore, copper ore Mining was seen to be a much more viable business, also because of the lucrative market for copper on both in Zambia and on the international market.

4.2.2 Site Alternatives

Most of the potential areas in Zambia are under mining activities hence the choice of where to conduct mining is largely determined by availability of mineral resources and the license by the Ministry of Mines and Minerals Development. Therefore, there was no option for the site.

4.2.3 Mining Method Alternatives

- Option 1 (Preferred): Open pit mining – Involves removing overburden and cleaning ore to extract copper.
Advantages: High ore recovery, operational flexibility, better productivity, enhanced safety, and lower costs.
- Option 2: Underground mining – Involves digging tunnels to access veins of copper ore.
Disadvantages: Higher costs, less operational flexibility, and safety risks compared to open pit mining.

4.2.4 Mining Technology Alternatives

- Option 1 (Preferred): Surface mining with site preparation – Involves overburden drilling, blasting, and reclamation of the site.
Advantages: Suitable for the targeted mineral, allows more control over the mining process, and supports future site reclamation.
- Option 2: Quarrying – Suitable for stone aggregates but not applicable for the targeted copper ore.
Disadvantages: Does not apply to copper ore.
- Option 3: Dredging – Involves extracting materials from under water.
Disadvantages: Unsuitable for copper mining.
- Option 4: Hydraulic mining – Involves using water to fracture materials, typically used for placer deposits.
Disadvantages: Not applicable to the copper deposits being targeted.

4.2.5 Raw Materials Alternatives

- Option 1 (Preferred): Heavy equipment – Includes excavators, loaders, and haulage trucks.
Advantages: Efficient, fast, and safer for workers.
- Option 2: Manual methods – Rock breaking with picks, shovels, and wheelbarrows.
Disadvantages: Inefficient, time-consuming, and poses higher risks to workers.

4.2.6 Water Source Alternatives

- Option 1 (Preferred): Boreholes for wash water and bottled drinking water.
Advantages: Feasible for the remote location, ensures water availability.
- Option 2: Piped water – Not viable due to the remoteness of the site.
Disadvantages: Impractical for the remote location.

4.2.7 Energy Source Alternatives

- Option 1 (Preferred): Generators – Provide lighting and energy for machinery in remote areas.
Advantages: Reliable for remote areas, cost-effective.
- Option 2: ZESCO power – Not viable due to the high cost and remoteness of the project site from the power grid.
Disadvantages: High costs and distance from the power grid.

4.2.8 Waste Management Alternatives

- Option 1 (Preferred): The first option was the disposal of solid waste at the designated existing dump site for the current operating Mine. The first option was the best option considering that it is environmentally sustainable

4.2.9 Sanitary Waste Alternatives

- Option 1 (Preferred): The first option was the use of portable toilets. The first option of using portable toilets was selected considering the nature of operations.
- Option 2: Pit latrines – Cheaper but not ideal for long-term use.
Disadvantages: Unsuitable for a project expected to last 20 years.

4.3 List of chosen alternatives in order of preference

4.3.1 Considered Product/Service

There is readily available copper ore at Kasisi East Ore Body. Therefore, copper ore Mining was seen to be a much more viable business, also because of the lucrative market for copper on both in Zambia and on the international market.

4.3.2 Considered Site

Most of the potential areas in Zambia are under mining activities hence the choice of where to conduct mining is largely determined by availability of mineral resources and the license by the Ministry of Mines and Minerals Development. Therefore, there was no option for the site.

4.3.1 Considered Mining method

The first option which was selected was the development of an open pit mine for extraction of copper which will involve the removal the overburden, and cleaning of the ore to obtain copper. The first option was selected because surface mining, is more advantageous in terms of ore recovery, operational flexibility, productivity, safety, and cost. And was seen to be the most feasible and cost effective.

4.3.2 Considered Technology

The proposed project will involve the use of surface mining which will have technology options, the first option considered is: site preparation, overburden drilling and blasting, loading and hauling overburden (waste), drilling and blasting the deposit, loading and hauling the ore, and reclaiming the site. The option was considered since the mineral being targeted will require more benches and that the overburden is removed and with the plans of future reclamation of the site.

4.3.3 Considered Source of Energy

The first option is the use of generators to facilitate lighting, and other machinery requiring energy, this is recommended for remote locations. The other option includes using of electricity provided by ZESCO, which is not possible because of the remoteness of the project location from the grid line.

4.3.4 Considered Raw Materials

The first choice of the raw materials included the following: equipment's (excavators, loaders, and haulage trucks). The first choice was selected because it is efficient compared to other options which will take too long and pose more threat to a lot of workers who would be required to manually break the rocks.

4.3.5 Considered Water Source

The first option which was considered was sourcing the wash water from the boreholes on existing facilities which will be very minimal whilst utilizing bottled water for drinking.

4.3.6 Considered Waste Management Method

The first option was the disposal of solid waste at the designated existing dump site for the current operating Mine. The first option was the best option considering that it is environmentally sustainable.

4.3.7 Considered Sanitary Waste Management

The first option was the use of portable toilets. The first option of using portable toilets was selected considering the nature of operations.

Sino Xinyuan Mining Limited conducted thorough feasibility study for the proposed project. The implementation of the proposed project will also bring along socioeconomic benefits for the project area, region and the country at large. Therefore, the company believes that the best option was to implement the project in line with the presented project description whilst protecting the environment in line with the international best practice and the laws of Zambia.

4.4 Reasons for choosing the preferred alternatives

4.4.1 Product/Service

There is readily available copper ore at Kasisi East Ore Body. Therefore, copper ore Mining was seen to be a much more viable business, also because of the lucrative market for copper on both in Zambia and on the international market.

4.4.2 Site Alternatives

Most of the potential areas in Zambia are under mining activities hence the choice of where to conduct mining is largely determined by availability of mineral resources and the license by the Ministry of Mines and Minerals Development. Therefore, there was no option for the site.

4.4.3 Mining Method Alternatives

The first option, surface mining via an open pit, was chosen because it offers better ore recovery, operational flexibility, productivity, safety, and lower cost compared to underground mining. The underground method was rejected due to its higher establishment costs and lower feasibility for the targeted mineral.

4.4.4 Mining Technology Alternatives

Surface mining technology involving site preparation, overburden removal, and site reclamation was selected. This option aligns with the project's requirement for multiple benches and effective overburden removal. Other alternatives like quarrying, dredging, and hydraulic mining were rejected as they were either unsuitable for the ore type or not applicable for the project.

4.4.5 Raw Material Alternatives

The use of heavy machinery such as excavators, loaders, and haulage trucks was selected because it is more efficient and safer than manual labor, which would require excessive time and pose significant risks to workers involved in rock-breaking tasks.

4.4.6 Water Source Alternatives

The first option which was considered was sourcing the wash water from the boreholes on existing facilities which will be very minimal whilst utilizing bottled water for drinking.

4.4.7 Energy Source Alternatives

The use of generators was chosen because the remote location of the site made connecting to the ZESCO grid too expensive and impractical. Thus, generators were the most feasible option.

4.4.8 Waste Management Alternatives

The first option was the disposal of solid waste at the designated existing dump site for the current operating Mine. The first option was the best option considering that it is environmentally sustainable.

4.4.9 Sanitary Waste Alternatives

The first option was the use of portable toilets. The first option of using portable toilets was selected considering the nature of operations.

1.0 ENVIRONMENTAL BASELINE STUDY

1.1 Description of the Project Area

The proposed Kasisi East open pit copper mine is located in Chongwe District, approximately 40 km east of Lusaka Central Business District (CBD) and about 20 km from Kenneth Kaunda International Airport (KKIA). The project site lies within the Kasisi Area under the Large-scale mining license (No. 26238-HQ-LML). The project site is accessible via the Great East Road and Kasisi Road, with the final 2 km stretch branching off from a gravel road near Kasisi Mission. The Chongwe River lies approximately 2.09km south of the proposed pit, indicating the need for hydrological and environmental safeguards. The area is characterized by mixed-use rural development, with agricultural activities being predominant. The project will be implemented with attention to land-use coordination, stakeholder engagement, and environmental compliance.

The surrounding landscape includes:

- Kasenga Farm Block to the west and north,
- Kasenga B Cemetery 1.6 km north,
- Kasisi Area to the south.

Key nearby developments include:

- Kumena Basic School (2.45 km north),
- CMML Church (2.5 km northwest),
- Farmhouses, sheds, cultivated fields, and center pivots used by Kasisi Farmers Trust within the proposed site boundary.

Table 11 Geographic Coordinates of the proposed project

Coordinates (WGS 84, Zone 35S)	
Latitude	Longitude
15°13'11.99"S	28°33'23.00"E
15°13'11.95"S	28°33'28.90"E
15°13'20.70"S	28°33'29.54"E
15°13'20.85"S	28°33'23.68"E

1.1.1 Ecological Zoning as well as the state of the Environment

The proposed project site lies in Chongwe District in Zambia falls primarily within agro-ecological region IIa, according to research papers. This region experiences an average annual rainfall of 800-1000mm and a growing season of 100-140 days.

Figure 3 Map of Zambia showing the agro-zones of Zambia



Due to the fact that the region where the project site will lie has faced some human activities such as agriculture, certain parts of the area are relatively disturbed.

Current Environmental State:

The project area is presently characterized by a predominantly disturbed landscape, with extensive vegetation clearance evident across the site. The ground surface is largely bare, consisting of loose, dry sandy soils interspersed with occasional patches of low-lying shrubs and small bushes. Vegetative cover is minimal, and there is a notable absence of ground-level grass or organic litter, resulting in reduced soil stability. The surrounding environment comprises a flat to gently undulating terrain, with remnant vegetation limited to scattered shrubs and degraded grassland. Overall, the site reflects a degraded ecological state with diminished biodiversity and reduced natural habitat integrity, consistent with an area transitioning from natural cover to active development use.

Figure 4 Current Environmental State



Figure 5 Shows the Project Area of The Proposed Project



5.2 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, and laboratory analysis 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 thematic 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 samples were drawn from streams and wells 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 Particles Detector – M2000C). Sampling focused on pollutants of concern such as Total Suspended Particulates (TSP), Particulate Matter (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂), nitrogen oxides (NO_x), 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/development 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.

5.3 Ecological Resources Fauna

The project area, located in Kasenga, Chongwe District, has been significantly affected by anthropogenic activities, particularly agriculture and infrastructure development, leading to the depletion of large mammal populations. Faunal assessment was based on sightings, local indigenous knowledge, and indirect evidence such as escape routes, burrows, and tracks. While large mammals are now rare in the area, smaller mammals, reptiles, and amphibians persist in fragmented habitats. These include various rodents, lizards, and occasionally monkeys seen near woodland edges. Human activity has reduced the area's wildlife richness, with the current faunal landscape reflecting secondary occupation by adaptable species.

Table 12 below lists common animals that were observed or which the local people confirmed that these animals do exist.

Scientific Name	Common Name
<i>Cercopithecus mitis</i>	Blue Monkey
<i>Lepus microtis</i>	African Savanna Hare
<i>Crocidura spp.</i>	Shrews
<i>Thryonomys swinderianus</i>	Greater Cane Rat
<i>Varanus niloticus</i>	Nile Monitor Lizard

No rare or endangered animals exist in the project area.

5.4 Ecological Resources Flora

The vegetation in the project area is characteristic of the Miombo woodland, which dominates much of Zambia. This includes wet Miombo woodland interspersed with dambo grasslands, riparian forests, and Chipya woodlands. The dominant tree genera include *Brachystegia*, *Julbernardia*, and *Isoberlinia*, often co-existing with other key species such as *Erythrophleum africanum*, *Parinari curatellifolia*, and *Pterocarpus angolensis*. While some pockets of pristine woodland remain, much of the vegetation has been altered due to slash-and-burn agriculture and settlement expansion.

Table 13 Flora observed in the project area

Scientific Name	Common Name
<i>Brachystegia spiciformis</i>	Zebrawood
<i>Julbernardia paniculata</i>	Munondo
<i>Isoberlinia angolensis</i>	African Rosewood
<i>Erythrophleum africanum</i>	African Blackwood
<i>Pterocarpus angolensis</i>	Bloodwood / Mukwa

There are no rare or endangered flora species in the project area.

5.5 Birds

Bird life in the area reflects the diversity of Miombo woodlands, with numerous bird species adapted to forest, thicket, and open grassland habitats. While species richness is affected by seasonal changes and habitat disturbance, several birds are resident, with others being migratory. Bird diversity provides an important indicator of the area's ecological integrity.

Table 14 presents the birds that have been spotted in the project area.

Scientific Name	Common Name
<i>Corythaixoides concolor</i>	Grey Go-away Bird
<i>Tockus alboterminatus</i>	Crowned Hornbill
<i>Cisticola chiniana</i>	Rattling Cisticola
<i>Bubulcus ibis</i>	Cattle Egret
<i>Pycnonotus barbatus</i>	Common Bulbul

No rare or endangered birds exist in the project area.

5.6 Geology and Hydrogeology

The Kasisi/Kasenga area is predominantly underlain by Precambrian metasediments, which have been intruded by granitic and basic bodies. These metasediments are classified into the Basement Complex (granitic rocks) and an unconformable Katanga sequence (schists, flaggy psammites, quartzites, minor calcareous horizons). The age of these rocks ranges from Lower Precambrian to Lower Palaeozoic. The area exhibits few visible rock outcrops, especially in the eastern part, while dolomite is found at a depth of two meters in the western part. The study area is situated on the edge of a large quartz-muscovite-biotite schist, bordering a crystalline dolomitic limestone. The hydrogeology of the Chongwe catchment is characterized by schists, quartzites, and basement complex rocks. The depth of the water table in the project area is approximately 18 meters, though it can vary up to 40 meters where potable water is found. Boreholes are present on the site, and additional boreholes were drilled during Sinomine's explorations. The Chongwe River catchment has few known aquifers, with the most productive ones located in the far western (Lusaka) area. The groundwater at the proposed mine and surrounding catchment is relatively deep, ranging from 40 to 50 meters.

5.7 Soils

The project area consists of clay soils predominantly in the east and sandy soils in the south. These are derived from the underlying schists and dolomitic rocks. Soil fertility is moderate, supporting cultivation of vegetables, maize, and legumes. However, soil erosion risk is high due to seasonal rainfall, particularly where vegetation cover is sparse or disturbed.

Methodology: 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/development and rehabilitation works post-project closure.

Table 15 Soil Sample Results

Parameter	Unit	Clay Zone (East)	Sandy Zone (South)	Interpretation
Soil Texture	-	Clay Loam	Sandy Loam	Moderately cohesive vs. loose soils
pH (H ₂ O)	-	5.4 – 6.2	5.8 – 6.5	Moderately acidic; suitable for crops
Organic Matter (OM)	%	1.8 – 2.6	1.0 – 1.5	Low to moderate fertility
Total Nitrogen (N)	%	0.09 – 0.12	0.05 – 0.08	Low – supplemental fertilization needed
Available Phosphorus (P)	mg/kg	6 – 12	4 – 10	Low – limits early plant development
Exchangeable Potassium (K)	mg/kg	85 – 140	60 – 110	Moderate – acceptable for agriculture
Lead (Pb)	mg/kg	<15	<12	Below FAO/WHO limits for soils
Arsenic (As)	mg/kg	<2	<1.5	Not of concern
Cadmium (Cd)	mg/kg	<0.5	<0.4	Well below contamination thresholds
Chromium (Cr)	mg/kg	20 – 35	15 – 30	Within acceptable range
Copper (Cu)	mg/kg	18 – 25	12 – 20	Normal for mineralized terrain
Zinc (Zn)	mg/kg	30 – 60	25 – 50	Below phytotoxic levels

Interpretation & Observations:

- Soil Fertility: Fertility levels are moderate in the clay zones and relatively lower in the sandy zones. Low nitrogen and phosphorus levels indicate the need for nutrient management, particularly if soils are to be used for revegetation post-mining.
- Acidity: Soil pH falls in the mildly acidic range, suitable for most local crops, though liming may be necessary in some zones to optimize productivity.
- Contamination: Heavy metals such as lead, cadmium, and arsenic are all well below international threshold values (FAO/WHO), suggesting the site is free from industrial or mining-related contamination to date.
- Construction Suitability: Clay soils, while cohesive and better for structural foundations, may pose challenges in drainage and workability. Sandy soils offer better drainage but are structurally weak and prone to erosion, especially during the rainy season.
- Erosion Risk: The sandy soils in the southern section are particularly prone to erosion due to low cohesion and sparse vegetation. Stabilization measures will be necessary during site clearing and development.

5.8 Drainage

The drainage pattern at the proposed mine site flows towards the Chongwe River, which is located approximately 2.09km south of the project. The Chongwe catchment faces increasing anthropogenic and socio-economic activities, leading to water shortages, particularly from July to November. While the Chongwe River typically flows year-round during good rainy seasons, it can dry up by August in low rainfall years. Another significant water body in the project area is the Chalalobuka Stream, which has been dammed and serves as a water source for both agriculture and domestic use for the local community. Drilling at the mine site indicates no connection between the surface water in the dam and the underground water.

5.9 Climate

The area experiences a sub-tropical climate, influenced by the Inter-Tropical Convergence Zone (ITCZ). Rainfall occurs from October to April, with an annual average of 865 mm over 77 days, mainly in December and January. The dry season extends from May to September, characterized by lower humidity, high evapotranspiration, and frequent bushfires. These climatic patterns significantly affect vegetation cycles and water availability.

Figure 6 Chongwe Climatic Data

Climate Chongwe: Weather By Month

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Oct	Dec	Year
Record high °C (°F)	32.36 (90.25)	31.35 (88.43)	33.37 (92.07)	30.34 (86.61)	29.33 (84.79)	28.32 (82.98)	30.34 (86.61)	37.42 (99.36)	40.45 (104.81)	42.47 (108.45)	39.44 (102.99)	34.38 (93.88)	42.47 (108.45)
Average high °C (°F)	25.96 (78.73)	25.47 (77.85)	25.68 (78.22)	25.1 (77.18)	24.43 (75.97)	22.68 (72.82)	22.87 (73.17)	26.9 (80.42)	30.85 (87.53)	32.86 (91.15)	31.14 (88.05)	27.44 (81.39)	26.78 (80.2)
Daily mean °C (°F)	23.28 (73.9)	22.88 (73.18)	22.84 (73.11)	21.79 (71.22)	20.4 (68.72)	18.59 (65.46)	18.62 (65.52)	22.35 (72.23)	26.24 (79.23)	28.49 (83.28)	27.49 (81.48)	24.57 (76.23)	23.13 (73.63)
Average low °C (°F)	18.25 (64.85)	17.96 (64.33)	17.35 (63.23)	15.67 (60.21)	13.14 (55.65)	10.97 (51.75)	10.63 (51.13)	13.1 (55.58)	16.35 (61.43)	18.62 (65.52)	19.47 (67.05)	18.95 (66.11)	15.87 (60.57)
Record low °C (°F)	14.16 (57.49)	14.16 (57.49)	13.15 (55.67)	11.12 (52.02)	9.1 (48.38)	6.07 (42.93)	7.08 (44.74)	7.08 (44.74)	9.1 (48.38)	11.12 (52.02)	13.15 (55.67)	15.17 (59.31)	6.07 (42.93)
Average precipitation mm (inches)	208.72 (8.22)	155.39 (6.12)	74.96 (2.95)	30.02 (1.18)	4.54 (0.18)	1.87 (0.07)	1.38 (0.05)	0.24 (0.01)	0.26 (0.01)	6.14 (0.24)	79.13 (3.12)	169.68 (6.68)	61.02 (2.4)
Average precipitation days (≥ 1.0 mm)	24.27	21.33	14.34	6.43	1.19	0.36	0.0	0.0	0.09	1.84	11.31	21.79	8.58
Average relative humidity (%)	84.86	87.37	84.24	77.67	68.74	65.7	60.32	45.7	35.43	37.66	53.63	75.52	64.73
Mean monthly sunshine hours	11.73	10.43	10.56	9.38	8.6	8.52	8.62	10.12	12.12	12.78	12.78	12.27	10.66

Source: <https://weatherandclimate.com/zambia/lusaka/chongwe>

5.10 Landscape and Topography

The landscape of the project area is characterized by Miombo woodland, with some relic gallery forests, riparian forests, Munga woodlands, Kalahari woodlands, floodplain, and dambo grasslands. The topography is generally flat to gently undulating. The visual character of the area will be affected by the proposed mine development, including vegetation removal and construction of infrastructure, which will be noticeable from the air but partially screened by remaining woodland and local topography.

5.11 Land Use

Current land use is dominated by agriculture, particularly vegetable cultivation operated by Kasisi Farm Trust. The surrounding areas include resettlement schemes, forested patches, and small-scale subsistence farms. Land use changes have been significant, with natural woodlands gradually giving way to cultivated fields. Other significant land uses in the broader Chongwe catchment include irrigated agriculture, rainfed farms/ranches/grasslands/bareland, built-up areas, water bodies, and forest land. The proposed project will result in a change of land use from agriculture to mining.

5.12 Ground and Surface Water

Surface Water: The main rivers in the Chongwe catchment are the Ngwerere, Chalimbana, and the Upper and Middle parts of the Chongwe River. Several dams exist along these rivers, with Ray's Dam on the Upper Chongwe being the largest. The Chongwe River's water levels can become very low during the dry season, sometimes ceasing to flow entirely. The Chalalobuka Stream, dammed within the project site, provides water for agriculture use. External inflow to the Chongwe River catchment primarily comes from the Kafue River catchment, through wastewater discharges from Lusaka Water and Sewerage Company (LWSC) treatment plants into the Ngwerere Stream, a tributary of the Chongwe River. The mean discharge of wastewater into the Chongwe River catchment via Ngwerere Stream is approximately 0.9533 m³/s.

Groundwater: The groundwater in the project area is relatively deep, typically between 40-50 meters. The most productive aquifers are located in the far western (Lusaka) area. The calcareous rock lens southeast of Chongwe town is a known aquifer, tapped by rural water supply boreholes, with average yields around 0.4 L/s. Drilling at the mine site indicates no direct connection between surface water in the dam and underground water.

Methodology: Water quality data was collected to characterize both surface and groundwater sources in the vicinity of the project site. Composite water samples were drawn from streams and wells 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 16 Water Samples Results

Parameter	Unit	Chongwe River	Chalalobuka Stream	Underground Water	Zema Limit
pH		7.5	7.1	7.8	6.0-9.0
Turbidity	NTU	12	15	1	≤15
Conductivity	μS/cm	480	350	620	≤4300
TSS	mg/l	18	22	5	≤100
TDS	mg/l	250	180	320	≤3000
SO4	mg/l	35	28	45	≤800
Cl	mg/l	42	35	50	≤800
NO3	mg/l	3.2	2.8	1.5	≤45
Fe	mg/l	0.18	0.22	0.1	≤2.0
Cu	mg/l	0.02	0.015	0.01	1.5
Co	mg/l	0.005	0.003	0.002	1
Pb	mg/l	0.01	0.008	<0.005	≤0.5
Mn	mg/l	0.06	0.04	0.03	1
Zn	mg/l	0.12	0.08	0.05	1
Ni	mg/l	0.01	<0.01	<0.01	≤0.5
As	mg/l	<0.005	<0.005	<0.005	≤0.5
Cd	mg/l	<0.002	<0.002	<0.002	≤0.5
Ca	mg/l	40	35	75	500
Mg	mg/l	15	12	25	500
Total Hardness	mg/l	160	130	280	500
Feecal Coliform	mg/l	25	18	0	≤5000
Total Coliform	mg/l	120	90	5	≤25000

Findings:

The water quality results for the Chongwe River, Chalalobuka Stream, and groundwater indicate generally safe conditions, with all parameters complying with Zambian regulatory standards (ZEMA/ZABS). The Chongwe River shows slight elevations in turbidity (12 NTU), iron (0.18 mg/l), and total coliforms (120 CFU/100ml), likely due to dry-season sediment resuspension and minor anthropogenic inputs, though levels remain within acceptable limits. The Chalalobuka Stream, influenced by agricultural activity, exhibits marginally higher TSS (22 mg/l) and iron (0.22 mg/l) but maintains low nutrient and bacterial counts, suggesting manageable runoff impacts. In contrast, the groundwater demonstrates exceptional quality, with negligible turbidity (1 NTU), no faecal contamination, and only naturally elevated calcium (75 mg/l) and hardness (280 mg/l) from carbonate rock dissolution. Notably, heavy metals (Pb, Cd, As) and other trace elements are well below thresholds across all sources. These findings reflect stable water resources, with the river and stream requiring periodic monitoring for seasonal variability, while groundwater remains a reliable, low-risk source. Proactive measures such as erosion control near the Chalalobuka and continued wastewater management for the Chongwe could further safeguard water quality. Overall, the results underscore the importance of context-specific management to balance human use and ecological health.

5.13 Air Quality and Noise

5.13.1 Air Quality:

The baseline air quality in the project area is generally good, characterized by dry conditions with insignificant amounts of dust due to considerable tree cover. Air quality varies seasonally, with heavy rainfall quickly dispersing smoke and dust during the wet season, maintaining good air quality. During the dry season, smoke and dust can cause haze and reduced visibility. Apart from vehicular emissions, no industries emitting air pollutants exist in the area. Major sources of air pollution include bush burning and dust from the Kasisi Mission road.

Methodology: Air quality sampling was carried out using Temtop M2000C portable air quality monitors, focusing on major pollutants of concern: Total Suspended Particulates (TSP), Particulate Matter (PM₁₀ and PM_{2.5}), Sulfur Dioxide (SO₂), Nitrogen Oxides (NO_x), and Carbon Monoxide (CO). The sampling was conducted during the dry season—typically the period with the highest pollution due to dust and bushfires.

Sampling was undertaken at four key locations near sensitive receptors:

- **Location A:** Near Kasisi Mission Road (roadside)
- **Location B:** Chalalobuka Stream dam (downwind of bush burning)
- **Location C:** Kasisi Farm (agricultural zone)
- **Location D:** Proposed Mine Area (open woodland)

Each location was sampled for a minimum of 8 hours, with readings taken in the **morning (07:00–10:00)**, **midday (12:00–14:00)**, and **evening (17:00–19:00)**.

Table 17 Air Quality Sampling Results by Location and Time

Parameter	Units	ZEMA Limit	WHO Limit	A: Kasisi Rd Junction Morning	B: Chalalobuka Dam Midday	C: Kasisi Farm Trust Afternoon	D: Proposed Mine Site Evening
Particulate Matter							
PM _{2.5}	mg/m ³	50mg/m ³	25 (24-hr)	0.0325	0.0204	0.0237	0.0192
PM ₁₀	mg/m ³	50mg/m ³	50 (24-hr)	0.0558	0.0412	0.0443	0.0364
TSP	mg/m ³	50mg/m ³	—	0.1203	0.1015	0.1078	0.0927
Gaseous Pollutants							
SO ₂	µg/m ³	400µg/m ³	20 (24-hr)	ND	ND	ND	ND
NO _x (as NO ₂)	mg/m ³	100mg/m ³	40 (annual)	ND	ND	ND	ND
CO	µg/m ³	500µg/m ³	10 (8-hr)	ND	ND	ND	ND

Note: ND = Not Detectable (concentrations below the instrument detection threshold)

Interpretation of Air Quality Results:

- **Particulate Matter:** Highest concentrations of PM_{2.5} and PM₁₀ were recorded in the morning along Kasisi Road, attributed to dry conditions and vehicular activity. The values remained within both Zambian regulatory limits and WHO guideline thresholds, indicating no immediate air quality concerns.
- **Total Suspended Particulates (TSP):** Readings across all locations showed moderate levels, with the roadside location showing the highest due to unpaved road dust. All values were well below the limit for rural areas.

- Gaseous Pollutants (SO₂, NO_x, CO): These were not detectable at any of the sampling points, confirming the absence of significant combustion sources such as heavy industry or fossil fuel burning in the project area.

Conclusion:

The project area exhibits generally good air quality, with particulate matter being the only pollutant of concern during the dry season. No measurable concentrations of harmful gases were found, affirming that air pollution is primarily from natural and agricultural sources such as bush burning and road dust.

5.3.1 Noise:

The sound levels within the project area are relatively low, typically below 45 dB, reflecting the rural setting and absence of heavy industrial activities. The main sources of noise are vehicular traffic along Kasisi Road, social amenities like bars, and natural elements such as thunderstorms and wind.

Methodology: Ambient noise monitoring was carried out using a Casella CEL24X Sound Level Meter at four sites representative of local receptors and land uses. Noise was measured during the morning (07:00–09:00), afternoon (13:00–15:00), and evening (18:00–20:00) time slots. Results are expressed in dBA, representing A-weighted decibels to match human hearing sensitivity.

Table 18 Baseline Ambient Noise Levels by Location and Time

Location	Time of Day	Average (dBA)	Peak (dBA)	Dominant Sources
A: Kasisi Road Junction	Morning	47.2	54.1	Light vehicle passing, distant voices
B: Chalalobuka Dam	Midday	38.6	42.3	Birds, flowing water, wind rustling
C: Kasisi Farm Block	Afternoon	43.1	49.8	Hand tools, farm animals; goats, cattle and chicken
D: Proposed Admin Area	Evening	36.4	41.0	Wind, occasional voices, insects

Interpretation of Noise Results:

- All recorded ambient noise levels were below 55 dBA, complying with both WHO guidelines for residential and rural areas and Zambian Noise Emission standards.
- Kasisi Road Junction (Location A) had the highest levels due to passing motor bikes, bicycles and vehicles, especially during morning hours when community members commute or begin daily activities.
- Chalalobuka Dam and the proposed mine area (Locations B and D) were the quietest, reinforcing their rural, non-industrial character.
- No continuous or intrusive noise sources were detected. All elevated readings were momentary (e.g., goat bleats, passing motorcycle).

Conclusion:

The project area has a low ambient noise profile, consistent with a rural setting. Current levels offer a good benchmark for monitoring future increases, particularly during construction and operational phases of the mine.

5.14 Social, Economic and Cultural Issues

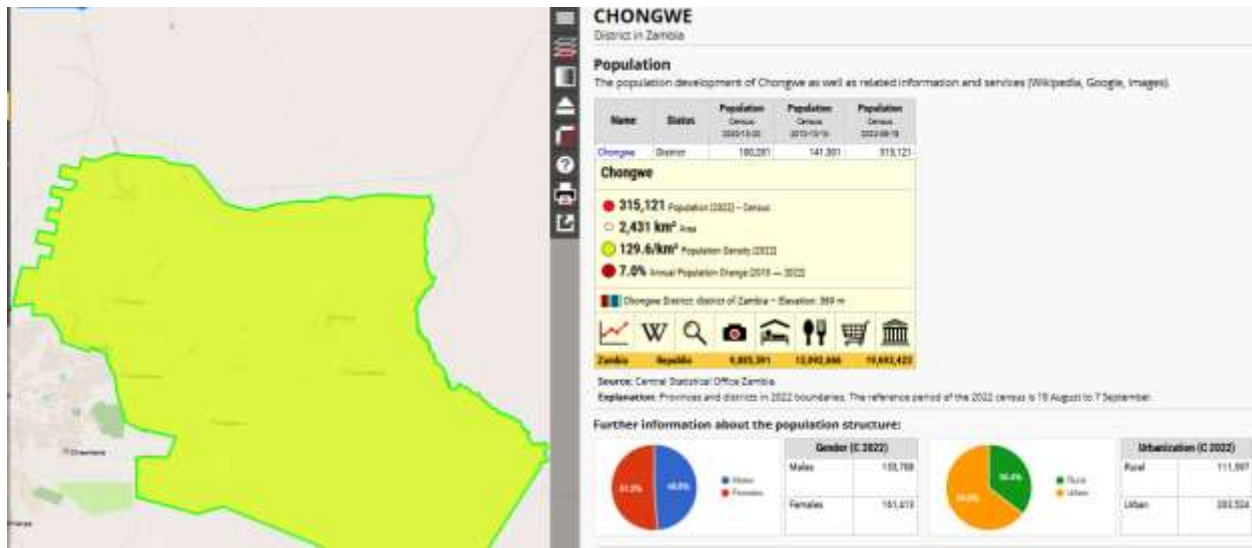
5.14.1 Population Distribution

According to the 2022 Zambia Census of Population and Housing, Lusaka Province had a total population of 3,093,617, making it the most densely populated province in Zambia. The population is characterized by a youthful age structure, with over 55% below the age of 25. Urbanization remains high, especially within Lusaka District, though peri-urban and rural districts such as Chongwe are also seeing notable growth.

According to the 2022 Zambia Census, Chongwe District has a population of 315,121 people, with approximately 153,708 males and 161,413 females. The area has experienced rapid demographic growth from 141,301 in 2010, indicating an annual population growth rate of approximately 7% over the past decade. The district covers a total land area of 2,431 km², translating into an average population density of about 130 persons/km².

Urbanization has increased markedly, with 64% (203,524) of the population now living in urban and peri-urban areas, particularly along the Lusaka–Chongwe corridor. The Kasisi area, where the proposed project is located, remains predominantly rural, although peri-urban characteristics are emerging due to proximity to Lusaka.

Figure 7 Chongwe District Population Distribution



5.14.2 Administration

Chongwe District falls under Lusaka Province and is administered by the Chongwe Municipal Council. The district constitutes a single parliamentary constituency and is divided into 21 wards, including Kasisi Ward. Traditional leadership is a significant governance layer, with the Paramount Chief of the Soli (Chieftainess Nkomeshya) exercising authority alongside subordinate chiefs and village headpersons.

5.14.3 Social Services and Amenities

Health Services:

Kasisi is served by the Kasisi Rural Health Centre, which provides basic outpatient services, maternal care, and immunization. More specialized services are accessed in Chongwe District Hospital or health facilities in Lusaka. Common health issues in the area include malaria, diarrhoeal diseases, HIV/AIDS, and respiratory infections.

Education:

The area hosts several primary schools and at least one secondary institution, the Kasisi Girls Secondary School, which had approximately 430 enrolled students as of 2018. Despite the presence of schools, dropout rates, particularly among girls, remain high due to economic hardship, domestic responsibilities, and early marriages. Most pupils travel to Chongwe or Lusaka for senior secondary and tertiary education.

Water and Sanitation:

Communities in Kasisi rely primarily on boreholes, shallow wells, and a few communal taps. Access to clean and safe water is generally adequate but not universal. Sanitation facilities vary, with most households using pit latrines.

Electricity and Roads:

The main access road to Kasisi is partially tarred, linking the area to Chongwe and Lusaka. Electricity supply is intermittent and only accessible in a few concentrated settlements. Households often rely on solar lighting and wood for cooking.

5.14.4 Economic Activities and Market Access

The local economy is dominated by small-scale agriculture, with the majority of households engaged in subsistence and semi-commercial farming. Key crops include maize, groundnuts, vegetables, sweet potatoes, and beans. Livestock such as chickens, goats, and cattle are reared for domestic use and limited sale.

Due to its proximity to Lusaka, Kasisi benefits from access to urban markets, making vegetable farming (rape, cabbage, onions) a viable source of income. The Chongwe open-air market serves as a key trading hub for local farmers. However, post-harvest losses, poor storage, and limited access to finance and inputs constrain productivity.

There are few non-agricultural income opportunities, and most families depend on farming for sustenance and livelihoods.

5.14.5 Education, Health and Gender Equity

Although Lusaka Province reports relatively high literacy rates (above 85%), rural sub-areas such as Kasisi lag behind, especially among women and girls. Girls' education is hindered by socio-cultural expectations and household poverty.

Healthcare access remains limited, with long distances to major facilities and erratic drug supplies. Women's access to healthcare and land is often restricted by patriarchal inheritance systems and traditional gender norms. Women contribute significantly to agriculture and market activity, but their representation in decision-making remains low.

Efforts by NGOs and local government aim to improve maternal health, support girls' education, and enhance women's financial literacy through microfinance and cooperatives.

5.14.6 Traditional and Religious Practices

The dominant religion in the Kasisi area is Christianity, particularly Roman Catholicism, due to the historical presence of the Kasisi Jesuit Mission. Nonetheless, many community members maintain traditional spiritual practices, including ancestor worship and belief in spiritual intermediaries (*mizimu*).

Key ceremonies, especially the Chakwela Makumbi, remain culturally and spiritually significant. These traditional rituals serve not only religious functions but also reinforce community ties, social values, and environmental stewardship.

5.14.7 Land Ownership and Land Tenure

The proposed project site is under leasehold tenure and is privately owned. The land, Lot No 2677/M, is currently owned by the Society of Jesus (Jesuits), who have leased a portion of it to Kasisi Farmers Trust for farming activities. Sinomine intends to purchase part of this land for the mine project. In Zambia, land tenure systems include Customary Tenure (under traditional leadership) and Leasehold Tenure (under state control, typically leased for 14 or 99 years). Land tenure in the Kasisi area is primarily customary, governed by traditional leaders. Most households lack formal land titles, which poses challenges for land use planning, development control, and compensation procedures.

5.14.8 Vulnerability and Potential for Resettlement or Compensation

The proposed open pit mining project has the potential to impact farmlands, grazing areas, and potentially homesteads within or near the project footprint. Given the predominance of customary land tenure, many affected households may lack legal documentation of land ownership, complicating formal compensation.

Any land acquisition or displacement will require adherence to the Zambian Lands Act, the Environmental Management Act, and international best practice standards. The project proponent shall carry out a detailed socio-economic survey and Resettlement Action Plan (RAP) to:

- Identify all Project-Affected Persons (PAPs)
- Determine types of loss (land, structures, income, access)
- Provide fair and timely compensation
- Implement livelihood restoration measures
- Ensure special provisions for vulnerable groups, including women, the elderly, youth, and female-headed households

Engagement with traditional leadership and community members will be essential to ensure a transparent and participatory resettlement process.

5.15 Archaeological and Cultural Environment

The proposed project area is located within the Kasisi Ward of Chongwe District, which is predominantly inhabited by the Soli-speaking people under the traditional jurisdiction of Her Royal Highness, Chieftainess Nkomeshya Mukamambo II, the Paramount Chief of the Soli. Cultural practices in the area are deeply rooted in ancestral reverence and traditional agriculture-based rituals. One of the most significant traditional ceremonies is the Chakwela Makumbi (literally translated as “pulling down the clouds”), a rain-making ceremony held annually in October to mark the onset of the planting season. The event is officiated by Chieftainess Nkomeshya and attracts large community participation. The ritual blends ancestral worship with Christian prayer, reflecting the syncretic nature of local spiritual beliefs.

Other cultural ceremonies in the wider Chongwe area include the Nkhombalyanga Ceremony, held in July under the leadership of Chieftainess Shikabeta. These ceremonies are considered vital for

community cohesion, spiritual continuity, and the preservation of indigenous identity. Ancestors, or mizimu, are believed to intercede with the supreme deity, Lesa, particularly in matters of rainfall, harvest, and community well-being.

In terms of archaeological and historical features, no documented prehistoric or archaeological sites (e.g., ancient settlements, rock paintings, or burial grounds) are currently known within or adjacent to the proposed project footprint. However, the Kasisi Mission, established by Jesuit missionaries in 1905, is located approximately 4 km south-west of the project site and is one of the oldest formal European establishments in the district. The mission continues to play a role in religious, health, and educational services for the surrounding communities.

Additionally, the TAZARA Memorial Park, currently under construction within Chongwe District, is another site of historical significance. Though outside the immediate project impact area, it serves as a symbolic space commemorating Chinese-Zambian cooperation during the construction of the TAZARA railway.

Based on the above, while the immediate project site does not overlap any known significant archaeological or cultural landmarks, due diligence through stakeholder consultation and monitoring will be essential during excavation to ensure that any chance discoveries are properly documented and preserved in accordance with the National Heritage Conservation Commission (NHCC) Act.

5.16 Built Environment

The built environment of the Kasisi area reflects its predominantly rural character, though its proximity to Lusaka and Chongwe urban centers has introduced moderate peri-urban development trends. The infrastructure in the area is generally basic, with key features as outlined below.

5.16.1 Physical Infrastructure

The primary access route to the Kasisi area is via a gravel road branching off the tarred Chongwe–Lusaka Road, which connects the community to Chongwe Town and Lusaka City. The road is generally passable year-round, though it deteriorates during the rainy season, with sections becoming muddy and rutted. There are no major bridges within the immediate project area, and culverts are used where necessary to support seasonal stream crossings.

Most internal roads within the project catchment are unpaved earth or gravel roads, often maintained by the community or local council on an ad hoc basis. Transport is primarily by foot, bicycle, or informal minibuses.

5.16.2 Housing

Housing in the area is predominantly informal and constructed using local materials. Common building types include:

- Traditional houses made from sun-dried mud bricks, with thatch or corrugated iron roofing;
- Semi-permanent houses with burnt bricks, cement-plastered walls, and iron sheet roofs;
- A few modern structures (particularly near Kasisi Mission) with concrete block walls, painted finishes, and cement floors.

Most homesteads are scattered in clusters, with compounds comprising multiple huts for sleeping, cooking, and storage, surrounded by small gardens or farmlands. Sanitation is primarily via pit latrines, and only a minority of homes have access to running water or electricity.

5.16.3 Public Infrastructure and Institutions

The following public institutions are present in or near the Kasisi area:

- Kasisi Rural Health Centre – A government-supported clinic offering outpatient services and basic maternal care.
- Kasisi Girls Secondary School – A Catholic-run institution with boarding facilities and classrooms up to Grade 12.
- Primary schools – Multiple basic education schools (e.g., Kumena Basic School, Kasisi Primary School) are scattered across the ward.
- Kasisi Jesuit Mission – Hosts a church, small community clinic, and an agricultural training centre.
- Local markets – Informal roadside markets and mobile vendors are common; there is no formal market structure within the immediate area.

Community meeting spaces include church halls and open grounds often used for traditional ceremonies or village meetings. Public buildings are typically constructed from burnt bricks or cement blocks, with galvanized roofing.

5.16.4 Utilities and Services

Electricity:

Access to the national power grid is limited. Some areas close to the mission and main roads have connections, while most households rely on solar lamps, kerosene lanterns, or candles for lighting. Wood fuel is the dominant energy source for cooking.

Water Supply:

Water sources in the Kasisi area include:

- Boreholes and hand-dug wells (community-owned or privately managed)
- Seasonal streams
- Limited piped water connections near mission facilities

Water supply infrastructure is often basic, and access is uneven, particularly in the dry season when borehole reliability becomes critical.

Telecommunications:

Mobile network coverage in the area is moderate to good, with major Zambian providers (Airtel, MTN, Zamtel) present. Most residents use mobile phones, but internet access is limited, particularly for households. Some public institutions (like schools and the mission) have basic internet connectivity.

5.16.5 Construction Materials and Architectural Styles

The dominant building materials used in the area include:

- Walls: Sun-dried or burnt clay bricks; occasionally concrete blocks
- Roofing: Thatched grass, galvanized iron sheets
- Flooring: Rammed earth or cement
- Fencing: Wooden poles, reeds, or wire mesh

Architectural styles are vernacular and functional, adapted to local climate and material availability. Most buildings are single-storey, with rectangular or circular floor plans. Ventilation is often natural, with minimal mechanical installations.

5.16.6 Planned and Ongoing Developments

While there are no major government infrastructure projects underway in Kasisi at the time of reporting, minor local initiatives supported by NGOs and religious missions include:

- Borehole rehabilitation and drilling in selected villages
- Classroom construction under the Ministry of Education's rural support programs
- Upgrading of selected gravel roads by the Chongwe Municipal Council
- Solar lighting projects at schools and health posts

The establishment of the proposed mine may catalyze further infrastructure development, particularly if linked to corporate social responsibility (CSR) initiatives targeting roads, electricity, and water supply in affected communities.

6.0 ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 Positive Socio-Economic Impacts and Enhancement Measures

6.1.1 Employment Creation

This is a direct Impact, long term and likely to affect both the local and regional economy. Preliminary mining works will be done by locals if the skills will be available locally. It is thus expected that these activities will create employment for the locals.

At operation, the project will require skilled technicians and crafts people as well as un-skilled labour. Over 50 employment opportunities will be available for persons from within local communities, including women. Both men and women will give equal employment opportunities in semiskilled and skilled work at the mine.

Furthermore, indirect opportunities for employment will be stimulated in the other sectors related to construction, such as manufacturers and suppliers of local raw materials and finished products and providers of services.

Enhancement Measures

Sino Xinyuan Mining Limited will ensure the following;

- First priority for employment of the various experts required will be given to the community. Opportunity for employment will be extended to others in different parts of the country if the skills are not found among community members.

6.1.2 Increased public revenues

The implementation of the project will increase revenue for both the central and local authorities. This revenue includes levies for the local planning authorities, direct and indirect such as VAT on the purchase of materials and services, PAYE (General workers and other formally employed persons will form by far the majority of created employment opportunities) as well as revenue to pension funds such as NAPSA and other regulatory agencies.

Enhancement Measures

Sino Xinyuan Mining Limited will ensure the following;

- The developer will ensure that all taxes due to the government are paid by themselves and all employees.
- The developer will ensure that all workers at the mine contribute to a pension fund such as NAPSA to ensure that employees are cared for even after retirement.

6.1.3 Capacity building

The scale of the project development with health and safety standards will involve considerable management and planning skills and will contribute to capacity building within the Zambian engineering and Mining sector. Co-operation between international suppliers of specialised equipment and local contractors and sub-contractors and companies will result in the transfer of skills to the locals and will also build additional local capacity.

Enhancement Measures

Sino Xinyuan Mining Limited will ensure the following;

- Since the proposed project will require manpower in some phases, the developer will employ locals who will work together with non-locals. The locals will be trained in various skills that will be useful to the proposed project.

6.2 Negative Socio-Economic Impacts and Mitigation Measures

6.2.1 Spread of HIV/AIDS, Covid, STIs, Malaria etc.

The major negative impact is that of the increased spread of diseases such as HIV/AIDSs, Covid, STIs and other communicable diseases. The spread of diseases will be worsened by the movement of people for other parts of the country to Chongwe and Kasisi area in particular. It is likely that those migrating to the area might transmit diseases as they mingle with the locals.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

The workers will be sensitized on HIV/AIDSs prevention, Covid prevention protocols and the prevention of STIs. Further, workers will be provided with condoms for HIV and STIs prevention.

The workers will also be protected from malaria by ensuring that the camp tents are all provided with mosquito nets. Mosquito repellents will be provided to the workers.

6.2.2 Change in land use and loss of agricultural land and fisheries

As a result of the implementation of the proposed project there is a likelihood of loss of previous land use activities, and also of land belonging to other people. This also includes the usage of the stream for any agricultural or fishing activities.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

- The silt drains from the overburden storage or dewatering activities will be adequately treated and reused to ensure that any nearby stream is not contaminated, and any fishing activities are not disturbed.
- The operations of the mine will be restricted within the license area for mining activities

6.2.3 Resettlement impacts

The proposed site falls within an area where there might be some possibility of crop fields or settlement from local people who might have invaded the mining area. Hence the impact needs adequate attention.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

- All the affected field owners will be provided with alternative land as agreed with the local community leadership. Thus, the alternative land will be provided by the local traditional leadership in consultation with the local leaders or headpersons.
- The company will allow the field owners to harvest all the crops before commencing any operations.

6.2.4 Loss of livelihood due to the project

With the establishment of the mine, it is likely that livelihood activities such as farming activities, wild fruits, charcoal and other resources will be lost.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

- Only the mining area of interest with the associated sensitive facilities shall be restricted from public access for safety and injury mitigation of the general public.
- Alternative access routes will be created for the locals if need be
- Any loss of livelihood will be compensated for.

6.2.5 Loss of customary rights and ethnicity

Loss of customary rights of the nearby communities might occur as a result of people coming from other places being employed at the mine. These people might not respect the customs of the locals. Additionally, the locals might lose their ethnicity. This is most likely to happen due to the mixing of workers from various backgrounds.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

The community's values and rights will be respected and upheld. Workers will have the freedom to worship and engage in their traditional practices. Traditional values that are important to the community will be upheld by the developer; and the developer will endeavor to work in harmony with the local community leaders and further respond to the needs of the community to participate in local traditions and customs.

6.2.6 Road Safety Reduced safety on access roads

Due to the nature of the project, high levels of traffic due to haulage of material will likely to be experienced during the construction/development and operational phases. If appropriate safety measures are not put in place, construction traffic carrying materials and / or workers to and from the site can have a significant impact on road safety. During operation, haulage trucks move to and from the site are likely to impact road safety. Then due to regular transportation of copper ore by

mining machinery and equipment the road is likely to be damaged and unfit for the general public, consequently, erode the gravel into the natural storm drains on the sides of the road.

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- **Road Maintenance:** Regular grading, drainage maintenance, and repair of potholes and cracks.
- **Dust Suppression:** Water spraying, dust-binding chemicals, or calcium chloride application to reduce dust generation.
- **Speed Limit:** Enforce speed limits to reduce road damage and dust generation.
- **Load Limit:** Implement weight limits to prevent overloading and reduce road damage.
- **Vehicle Maintenance:** Regular maintenance of trucks to prevent oil leaks and reduce emissions.
- **Traffic Management:** Implement traffic control measures like traffic signals or flaggers to reduce congestion.
- **Environmental Monitoring:** Regularly monitor and assess the environmental impacts of transportation.

6.2.7 Increased Pressure on Public Infrastructure

Pressure on public amenities (e.g., schools, clinic, etc)

The large scale mine is likely to result in population growth because people from different places will come to work in Kasisi. The influx of people to Kasisi will put more demand on current infrastructure like schools and clinics.

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- The developer will support local schools and clinic to alleviate the pressure created by population growth. It is also anticipated that private schools and clinics will be established in the area

6.2.8 Archaeological / Historical / Cultural Sites

Loss of cultural resource / heritage

No known archaeological or historical sites exist on the project site and as such no impacts on any features of importance to national heritage are expected.

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- Any artefacts or items of archaeological importance that may be found (e.g., during excavation works) that were not apparent on surface investigation will be reported by the Developer and appropriate procedures will be followed

6.3 Biophysical Environmental Impacts

6.3.1 Positive Impacts

No significant positive biophysical impact was identified from the nature of the project.

6.3.2 Negative Impacts

Air pollution

Air pollution due to dust generation from open areas, haul roads, open pit excavation works and exhaust fumes from machinery as well as dust generated at transient ore stockpiles and on the run of mine ROM ore pad. During minor blasting works it is also anticipated that dust will be emitted.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

- Water shall be sprinkled within open area in order to lessen dust emissions.
- Dust masks shall be provided to workers.
- Safety talks shall be conducted weekly.
- Open pit haul roads will be routinely sprayed with water to suppress dust generated by the movement of haul trucks and other heavy equipment.
- Dust generated at transient ore stockpiles and on the run of mine ROM ore pad will also be suppressed by water sprays. These will be mobile. Blasting will occur on very few occasions

- An environmental monitoring program shall be implemented prior to commencement of construction/development and continue through operation to ensure environmental and health and safety impacts are minimized as a result of air borne emissions and blasting effects.

Surface and Underground water pollution

The proposed project may lead to water pollution due to overburden and waste rock improper storage leading to high loads of silt in the storm water. Contamination of surface water may also occur as a result of the washing and maintenance of mine machinery equipment. This can be due to spills and/or accidental releases due to overflow from oil traps, equipment failure, inadequate handling, and storage.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

- The company will install adequate silt trap drainages to settle all the silt likely to contaminate and affect the surface water bodies.
- The workshops will have heavy equipment wash-bays equipped with impervious surfaces and containment to enable capture of all effluent from washing operations.
- Hydrocarbon traps will be installed in the workshop drainage system to treat all effluent prior to release
- Hydrocarbon traps will be installed around fuel tank facility to contain spillages
- The water which will be pumped from the open pit will be pumped into the settling ponds which will also be used for dust suppression activities
- Workers shall undergo environmental induction before commencement of work
- The company will have an emergency pond for containment of any excess water especially during the heavy downpour

Depletion of groundwater resources due to dewatering

The proposed project is likely to lead to change in water table level which might result from the increasing depth of the pits. The open pit mine will involve 'groundwater sink' allowing water to flow into the pit, via any permeable strata or fissured zones that are encountered. Within the pit more water will be collected in open drains or channels and directed to low points or sumps and then pumped away to the surface using Mine dewatering pump sets.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

- The ground water quantity will be maintained by use of groundwater recharge. Groundwater recharge will be used as an important process for sustainable groundwater management, since the volume-rate abstracted from an open pit in the long term shall be less than or equal to the volume- rate that is recharged. This will be done using the water from the settling ponds and recharged through the plant roots by draining the water onto the area with trees so that water can easily percolate through the tree roots thus helping to maintain the water table depth in the area.

Siltation of the water bodies

- Pumping groundwater: The in-pit pumping system will be required to pump any surface water generated in the pit. The water reaching the sumps and pumps will typically have run over the pit floor and along drainage channels and will have picked up some degree of suspended solids. Accordingly, in-pit pumps must be capable of pumping ‘dirty’ water with some suspended solids.
- Silt from the waste rock dump, overburden and ore storage area: due to heavy downpour there is a possibility of having silt being washed to the nearest water bodies.

Mitigation measure

Sino Xinyuan Mining Limited will ensure the following;

- The water from the open pit will be pumped into four settling ponds to be arranged in series with adequate volume ensuring that only clear water which is exceeding the reuse quantities is pumped into the environment from the last pond
- The settling ponds silt will be cleaned on a regular basis in order to maintain the size of the settling ponds
- The design of a waste rock constitutes a thick hard rock boundary and overburden deposited in the middle, in order to lessen on the washing away of loose material
- To have an efficient waste rock, silt traps will be vital, this will be a drainage channel around the waste rock and ore storage areas. The drainages will have within them silt traps to continuously settle any silt as the water flows. And will also have a weir at the discharge point.

Occupational health and Safety

Construction/development and operation of the project will involve many activities and procedures with potentially high-risk levels to the occupational health and safety of workers and personnel. The nuisance of dust and the movement of construction/operations traffic and machinery around the site have been mentioned above. Procedures with potentially high-risk levels also include:

- Entering and working in confined spaces (e.g., deep excavations)
- Work with open flames (e.g., welding and cutting operations)
- Work in hazardous environment (e.g., dusty environment)
- Work at height (e.g., scaffolding and roofs, platforms and structural steel)
- Operation and handling of heavy plant and machinery (e.g., operation of cranes and mobile equipment)

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- Strict adherence to safety measures and procedures will minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site.
- Workers will be trained in Safety Health and Environment (SHE) and the awareness talks will be held on a daily basis
- The workers will be provided with adequate PPE attire and anyone not putting on PPE attire will not be allowed in the mine area
- All visitors shall be required to comply with all the safety procedures at the mine site including short safety induction sessions before accessing the mine area
- The signage within the mine will be installed for easy communication of the safety procedures
- Workers working at heights will be provided with anchorage equipment
- Fire extinguishers and other firefighting equipment will be installed on every machinery
- The company has a clinic to attend to minor injuries and a standby emergency vehicle for referrals to the main hospital in cases of severe injuries

Risk of fire

The proposed open pit mining operations introduce potential fire risks arising from:

- Hazardous situations due to inadequate design or poor maintenance of mining equipment, such as excavators, dump trucks, and diesel-powered generators.
- Hazardous conditions resulting from substandard housekeeping practices, including accumulation of flammable materials (e.g., fuel residues, lubricants, and waste oils) in service areas and workshops.
- Unhygienic or unsafe working environments, such as oil spills on maintenance floors, slippery surfaces near fueling stations, or improperly stored combustible materials, increasing the likelihood of accidental ignition

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- Maintain proper workplace conditions and enforce strict housekeeping standards, ensuring all mining and maintenance areas are kept free of combustible waste and fuel spills.
- Implement robust equipment maintenance programs, ensuring that all mobile and stationary machinery, especially fuel systems and electrical components, are regularly inspected and maintained in safe working condition.
- Install adequate firefighting equipment, including strategically positioned fire extinguishers, fire hoses, and mobile firefighting units across critical locations such as the pit area, haul roads, fuel storage points, maintenance workshops, and the overburden storage area.
- Train all employees in fire prevention and firefighting procedures, providing periodic refresher courses and mandatory drills to ensure preparedness and quick response in case of fire outbreaks.
- Conduct regular mock emergency drills, simulating fire scenarios within the open pit, workshop, and supporting infrastructure to test readiness and improve response protocols.
- Enforce proper storage and handling of flammable materials, including safe fueling practices and containment measures for oil and lubricants to prevent ignition sources.

Public Health and Safety

Risk of water borne diseases

Negative impacts on health could also arise from the reduced water quality as a result of contamination of ground or surface water resources due to mining operation.

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- Proper waste management protocols during construction will be required to be observed.
- Water tests on surface water bodies will be conducted routinely.
- Water sampling and monitoring will be enhanced to ensure that the water is safe for usage
- Workers will be provided with bottled water or provided with disinfecting chemicals such as chlorine for drinking water

Transmission of malaria

Pools of stagnant water around the site can become breeding grounds for mosquitoes increasing the potential incidence of malaria.

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- Pools of stagnant water will be sprayed with insecticide
- Workers will be provided with mosquito nets and repellent to prevent malaria
- The company will have a clinic nearby to attend to any possible infections

Noise pollution

Particularly in Copper mining, where the extraction of very large size stone occur, there is usage of explosives such as great amount of dynamite etc. which creates high frequency of sound including vibration. The use of explosives as a result have devastating consequences in terms of permanent migration of wildlife and subsequently environmental change may that lead to different changes in living biota of ecosystem. Mining blasts produce sound with high frequency, the sound can produce disturbance in mode of life. Animals are highly sensitive to blasting, the blasting cause reproductive isolation in animals through which animals adopt to different environment, and get exposed to different predators which renders their viability decreased in an ecosystem. High sound

frequencies also diminish the growth and reproduction of flora species resulting in stunted growth of tree species and a reduced forest thicket.

Mitigation measures

Sino Xinyuan Mining Limited will ensure the following;

- The mining equipment will be restricted to the mine area only
- The mining equipment and trucks will be serviced on a monthly basis to ensure that the noise is reduced
- The blasting activities will make use of modern technology explosives with minimal noise and vibrations with ranges of effects not exceeding 1Km.
- The workers will be provided with ear protection equipment

Vibrations damaging structures in nearby settlements

Particularly in Copper mining, where the extraction of very large size stone occurs, there is usage of explosives such as great amount of dynamite etc. which creates vibration.

Mitigation measure

Sino Xinyuan Mining Limited will ensure the following;

- During blasting all the workers will be notified using a siren and alarms. Further workers shall be notified of blasting schedules for the mine.
- Mining engineers will be involved during the blasting activities to ensure that the right explosives having short range effects are utilized. Further the experts will be involved to employ geotechnical analysis which involves analysing principles of soil and rock mechanics to investigate rock mass conditions and determine their relevant physical (mechanical) and chemical properties in order to predict and monitor the rock mass response to mining explosives for the purposes of stability,
- Design safe pits that will enhance minimized vibrations to allowable standards, these activities resulting in vibrations will be properly scheduled to ensure minimized disturbance to the immediate environment.

Fly rocks injuring members of the surrounding

As blasting activities take place, there is a possibility of having flying rocks likely to injure the nearby communities and workers.

Mitigation measure

Sino Xinyuan Mining Limited will ensure the following;

- Fly stone danger zones will be marked throughout the blasting sites which will lead to evacuation of workers near the site
- The open pit location will be over 1Km from the nearby settlement and with the blasting method to be utilized it is unlikely to have rocks affecting the settlers
- The company will sound sirens clear enough around the blasting sites

Hazardous Waste Generation

The development and operation of the proposed open pit copper mine at Kasisi East will result in the generation of various types of hazardous waste. This waste arises primarily from the use of heavy mining equipment, maintenance activities, site operations, and technological upgrades of supporting infrastructure.

The key types of hazardous waste anticipated include liquid hazardous waste (petroleum-based products, chemicals) and solid hazardous waste (primarily electronic waste).

Solid Hazardous Waste (Electronic Waste)

With ongoing operations and the integration of new equipment for the open pit, there will be gradual accumulation of electronic waste (e-waste). This may include damaged or obsolete items such as:

- Computers and servers used for geological modeling, pit design, and operational management
- Communication devices (radios, telephones, network equipment)
- Surveillance and safety monitoring systems
- Electronic control units in equipment and automated systems
- Cabling, batteries, and small electrical tools

If not properly managed, components in e-waste (such as heavy metals and toxic chemicals) can leach into the environment, posing risks to soil, water, and human health.

Liquid Hazardous Waste

Liquid hazardous waste will primarily arise from:

- Used oils and lubricants from excavators, haul trucks, bulldozers, and other heavy machinery
- Fuel residues and spills from on-site refueling activities
- Hydraulic fluids and coolant solutions from equipment maintenance
- Contaminated water and sludge from pit dewatering and wash-down areas

If inadequately contained or treated, these materials can infiltrate soil and surface or groundwater, leading to localized contamination.

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- **Enhanced Waste Segregation:** All hazardous waste streams will be segregated at source to prevent cross-contamination and facilitate specialized handling and disposal.
- **Designated Hazardous Waste Storage Areas:** Dedicated, clearly marked storage areas will be established within the mine site for temporary accumulation of hazardous materials. These areas will be designed with impermeable surfaces and bunding to prevent leaks.
- **Management of Used Oils and Petroleum Products:** Used oils and lubricants will be collected in sealed, labeled drums and securely stored. They will be periodically transferred to licensed used oil recycling companies in compliance with ZEMA regulations.
- **Electronic Waste Handling:** E-waste will be stored in clearly labeled, secure bins or designated containers. Disposal will be carried out in consultation with the Zambia Environmental Management Agency (ZEMA) and through approved licensed e-waste recyclers or handlers.
- **Chemical Waste Disposal:** Any chemical waste (such as spent reagents or contaminated materials) will be handed over to licensed chemical waste handlers for safe treatment and disposal, in accordance with national hazardous waste management guidelines.
- **Spill Response and Remediation:** Spill kits will be readily available across operational areas, and staff will be trained on immediate containment and clean-up procedures. Contaminated soils, if any, will be excavated, treated, and safely disposed of.

Biodiversity impacts and mitigation measures

Effect on Local mass of organisms

The development of mining sites requires vast land clearing areas for which large percentage of areas become the victim of deforestation due to which the local mass of organism that depend on the habitat flora decrease.

Mitigation Measure

Sino Xinyuan Mining Limited will ensure the following;

- Only areas in the license area for high mineral concentration will be developed for pit designs, and large trees will be preserved throughout the areas of interest and only access routes will be cleared.
- The company will participate in tree planting programs by the forest department

Change in land use

Mining is well-known for its negative effects on the environment, due to the accumulation of large amounts of debris in the soil. The negative impact of these mining activities in the surrounding areas is mainly due to the presence of a high number of cuts. These cuts often have negative effects on the natural vegetation they grow in, such as low pH, concentration of toxic metals, low water retention capacity and low plant nutrient levels.

Mitigation Measures

Sino Xinyuan Mining Limited will ensure the following;

- The open pits will undergo a reclamation procedure during the decommissioning phase. Therefore, the waste rock and overburden will be well maintained for future application during the reclamation process.

Bio magnification

The water available in the mines clogs the sites containing high amounts of heavy metals including Ca, Co Cr. Cu, Fe, Mo. Ni, Pd, Sb, and zinc etc. Which ultimately mix with the freshwater present in canals, which directly affect the aquatic life. As a result of this contamination large amount aggregate in the organs of fishes, as fishes are used for food purpose which cause serious illness in human beings. The heavy metals accumulated in water absorbed by the plants roots and finally became the part of plant leaf and other different organs composition, animals including birds feed upon the leaves, seeds of trees. These metals target kidney liver etc. Different toxic substances are added via anthropogenic sources to the ecosystem that cause bio magnification and accumulate in tissue which cause tissue toxicity in biodiversity.

Mitigation Measure

Sino Xinyuan Mining Limited will ensure the following;

- The water shall be pumped from the open pits into the settling ponds where it shall be tested for heavy metals and treated before being allowed to flow in the storm drainage ways and consequently into the Chongwe River.

6.4 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.

6.5 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.

6.5.1 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).

6.5.2 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.

6.5.3 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.

6.5.4 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.

6.5.5 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.

6.5.6 Frequency

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

6.5.7 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.

6.5.8 Magnitude

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

Table 19 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 20: 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 21: 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

6.5.9 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.

6.5.10 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).

6.5.11 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.

6.5.12 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.

6.5.13 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.

$$\text{Impact Significance} = (M+D+E) \times (F+L)$$

Where:

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

Table 22: 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 23: 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 24 Evaluation of Impacts

Impact	Phase	Nature	Direct/Indirect	Spatial Extent	Duration	Frequency	Likelihood	Magnitude	Reversible	Residual	Cumulative	Irreversible	Significance
Employment Creation	Construction	Positive	Indirect	National	Short term	Monthly	Certain	Significant	No	Yes	Yes	No	High
	Operation	Positive	Indirect	National	Long term	Monthly	Certain	Significant	No	Yes	Yes	No	Very High
	Closure/Decommissioning	Negative	Indirect	National	Short term	Monthly	Likely	Marginal	Yes	Yes	Yes	No	Medium
Increased Public Revenues	Operation	Positive	Indirect	National	Long term	Yearly	Certain	Significant	No	Yes	Yes	No	Very High
Capacity Building	Operation	Positive	Direct	Local	Long term	Monthly	Likely	Significant	No	Yes	Yes	No	High
Spread of Diseases (HIV/AIDS, COVID-19, STIs, Malaria, etc.)	Construction	Negative	Indirect	Regional	Long term	Monthly	Likely	Significant	No	Yes	Yes	Yes	High
	Operation	Negative	Indirect	Regional	Long term	Monthly	Likely	Significant	No	Yes	Yes	Yes	High
Change in Land Use and Loss of Agricultural Land	Construction	Negative	Direct	Local	Permanent	Continuous	Certain	Significant	No	Yes	Yes	Yes	Very High
	Operation	Negative	Direct	Local	Long term	Continuous	Certain	Significant	No	Yes	Yes	Yes	Very High

& Fisheries													
Resettlement Impacts	Construction	Negative	Direct	Local	Long term	Continuous	Certain	Significant	No	Yes	Yes	Yes	Very High
Loss of Livelihood	Construction	Negative	Direct	Local	Long term	Continuous	Certain	Significant	No	Yes	Yes	Yes	Very High
Loss of Customary Rights & Ethnicity	Construction	Negative	Indirect	Local	Long term	Continuous	Likely	Significant	No	Yes	Yes	Yes	High
Reduced Road Safety	Construction	Negative	Direct	Local	Medium term	Monthly	Likely	Marginal	Yes	Yes	Yes	No	Medium
	Operation	Negative	Direct	Local	Medium term	Monthly	Likely	Marginal	Yes	Yes	Yes	No	Medium
Hazardous Waste & Air Pollution	Construction	Negative	Direct	Regional	Long term	Weekly	Likely	Significant	No	Yes	Yes	Yes	High
	Operation	Negative	Direct	Regional	Long term	Weekly	Likely	Significant	No	Yes	Yes	Yes	High
Surface & Underground Water Pollution	Construction	Negative	Direct	Regional	Long term	Weekly	Likely	Significant	No	Yes	Yes	Yes	High
	Operation	Negative	Direct	Regional	Long term	Weekly	Likely	Significant	No	Yes	Yes	Yes	High
Occupational Health &	Construction	Negative	Direct	Local	Long term	Weekly	Likely	Significant	No	Yes	Yes	Yes	High
	Operation	Negative	Direct	Local	Long term	Weekly	Likely	Significant	No	Yes	Yes	Yes	High

Safety Risks													
Public Health and Safety (Water Quality)	Operation	Negative	Indirect	Regional	Long term	Weekly	Likely	Significant	No	Yes	Yes	Yes	High
Risk of Waterborne Diseases	Construction	Negative	Indirect	Regional	Long term	Weekly	Likely	Marginal	Yes	Yes	Yes	No	Medium
	Operation	Negative	Indirect	Regional	Long term	Weekly	Likely	Marginal	Yes	Yes	Yes	No	Medium
Transmission of Malaria	Construction	Negative	Indirect	Local	Long term	Weekly	Likely	Marginal	Yes	Yes	Yes	No	Medium
	Operation	Negative	Indirect	Local	Long term	Weekly	Likely	Marginal	Yes	Yes	Yes	No	Medium
Noise Pollution	Construction	Negative	Direct	Local	Short term	Daily	Certain	Marginal	Yes	No	Yes	No	Medium
	Operation	Negative	Direct	Local	Short term	Daily	Certain	Marginal	Yes	No	Yes	No	Medium
Vibrations Damaging Structures	Construction	Negative	Direct	Local	Short term	Daily	Likely	Marginal	Yes	Yes	Yes	No	Medium
Fly Rocks Injuring Members of the Public	Construction	Negative	Direct	Local	Short term	Weekly	Likely	Marginal	No	Yes	Yes	Yes	High

Effect on Local Organism Mass (Deforestation)	Construction	Negative	Direct	Local	Long term	Continuous	Likely	Significant	No	Yes	Yes	Yes	High
Biodiversity Impacts (Habitat Loss)	Construction	Negative	Direct	Local	Long term	Continuous	Likely	Significant	No	Yes	Yes	Yes	Very High

Bird Disturbance (Construction)	Construction	Negative	Direct	Local	Short term	Continuous	Likely	Marginal	Yes	No	Yes	No	Medium
Vegetation Clearing	Construction	Negative	Direct	Local	Long term	Continuous	Certain	Significant	No	Yes	Yes	Yes	Very High
Bio Magnification	Operation	Negative	Indirect	Regional	Long term	Continuous	Likely	Marginal	No	Yes	Yes	Yes	High
Increased Pressure on Public Infrastructure	Construction/Operation	Negative	Indirect	Local	Long term	Monthly	Likely	Marginal	Yes	Yes	Yes	No	Medium
Loss of Cultural Resource / Heritage	Construction	Negative	Direct	Local	Long term	Continuous	Likely	Significant	No	Yes	Yes	Yes	Very High

7.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The EIA Regulations, S.I No. 28 of 1997 state that the developer must provide an Environmental Management and Monitoring Plan (EMMP) for a new developmental project. An EMMP outlines all measures required for environmental protection, which include mitigation measures, responsible personnel and monitoring plans throughout the life of a project.

The management of Sino Xinyuan Mining Limited will periodically monitor the Open pit mine for copper operations to ensure compliance to various mining and environmental regulations and, on a periodical basis, audit their compliance.

Management Commitments for Enhancing Positive Impacts

Increased Public Revenues

Management Commitment: Ensure proper tax compliance and transparent reporting of revenues to the government.

Monitoring: Annual audits of revenue contributions to government and local bodies.

Capacity Building

Management Commitment: Implement skill development programs for local employees and provide on-the-job training.

Monitoring: Quarterly assessment of skill enhancement programs and their outcomes.

Management Commitments for Mitigating Negative Impacts

Spread of Diseases (HIV/AIDS, COVID-19, STIs, Malaria, etc.)

Management Commitment: Implement comprehensive health and wellness programs, including awareness campaigns, testing, and provision of protective measures like mosquito nets, condoms, and vaccinations.

Monitoring: Regular health checks and disease surveillance.

Change in Land Use and Loss of Agricultural Land & Fisheries

Management Commitment: Provide fair compensation for land acquisition and establish alternative livelihood programs for affected farmers and fishers.

Monitoring: Periodic reviews of land use changes and success of resettlement programs.

Resettlement Impacts

Management Commitment: Develop a resettlement action plan that ensures fair compensation, livelihood restoration, and housing for displaced people.

Monitoring: Bi-annual reviews of resettlement success and livelihood restoration.

Loss of Livelihood

Management Commitment: Provide alternative employment or training for people whose livelihoods are affected by the project.

Monitoring: Assessment of livelihood restoration progress.

Loss of Customary Rights & Ethnicity

Management Commitment: Respect customary rights and engage with local communities to preserve cultural heritage. Offer support for cultural practices and ceremonies.

Monitoring: Continuous engagement with community representatives to assess the impact on customary rights.

Reduced Road Safety

Management Commitment: Implement road safety measures including signage, speed control, and community awareness programs.

Monitoring: Regular road safety audits and accident reports.

Hazardous Waste & Air Pollution

Management Commitment: Establish waste management protocols, including hazardous waste handling and air quality monitoring. Ensure waste is disposed of in line with environmental regulations.

Monitoring: Monthly air quality assessments and hazardous waste audits.

Surface & Underground Water Pollution

Management Commitment: Monitor water quality in nearby rivers and underground aquifers. Install wastewater treatment systems to ensure clean discharge.

Monitoring: Regular water sampling and analysis.

Occupational Health & Safety Risks

Management Commitment: Enforce occupational health and safety (OHS) policies, provide proper training and personal protective equipment (PPE), and conduct regular safety drills.

Monitoring: Continuous safety audits and incident reports.

Public Health and Safety (Water Quality)

Management Commitment: Ensure the project does not contaminate local water sources and provide alternative safe drinking water if necessary.

Monitoring: Regular water quality testing and community health assessments.

Transmission of Malaria

Management Commitment: Distribute insecticide-treated mosquito nets and spray mosquito-prone areas.

Monitoring: Health reports on malaria cases.

Noise Pollution

Management Commitment: restrict operations to certain hours to minimize disruption.

Monitoring: Monthly noise level assessments.

Vibration Damage to Structures

Management Commitment: Monitor vibration levels during blasting and ensure they are within safe limits for nearby structures.

Monitoring: Vibration measurement during every blasting event.

Fly Rocks Injuring Members of the Public

Management Commitment: Implement strict protocols for blasting, including public safety zones and warning systems.

Monitoring: Incident reports and monitoring of compliance with blasting safety measures.

Effect on Local Organism Mass (Deforestation)

Management Commitment: Reforestation programs and conservation efforts to replace lost trees and vegetation.

Monitoring: Annual audits of reforestation efforts.

Vegetation Clearing

Management Commitment: Minimize vegetation clearing and rehabilitate cleared areas with indigenous plant species.

Monitoring: Annual checks on vegetation regrowth.

Bio Magnification

Management Commitment: Regular testing of water and soil for heavy metals and toxins, especially near agricultural and aquatic environments.

Monitoring: Periodic heavy metal analysis.

Increased Pressure on Public Infrastructure

Management Commitment: Contribute to the development of public infrastructure like schools and clinics to alleviate pressure from population growth.

Monitoring: Regular community feedback and infrastructure audits.

Loss of Cultural Resource / Heritage

Management Commitment: Engage with local communities to preserve cultural heritage and compensate for any unavoidable impacts.

Monitoring: Regular cultural heritage impact assessments

7.1 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 Sino Xinyuan Mining Limited. Compliance with relevant Health, Safety and Environmental standards during construction/development will be the prime responsibility of Sino Xinyuan Mining 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 25 Environmental and social Management and Monitoring Plan

Aspect	Impact Description	Mitigation/Enhancement Measure (Sino Xinyuan Commitment)	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (ZMW)
Employment Creation	The proposed open pit mining project is expected to significantly boost employment within the Kasisi community and Chongwe District. It will offer both skilled and unskilled job opportunities, uplifting local livelihoods and reducing unemployment.	Sino Xinyuan Mining Company Limited is fully committed to prioritizing employment for local residents during both construction and operation. The company will also procure materials and services from local businesses to stimulate the community economy.	Bi-Annually	Construction & Operation Phases	Number of local hires; volume of local procurement	HR Manager	25,000
Public Revenues	Increased mining operations will lead to higher contributions to local and national government revenues through taxes and statutory payments.	Sino Xinyuan Mining Company Limited commits to fulfilling all tax obligations on time, including Pay-As-You-Earn (PAYE), mineral royalty, and pension fund contributions, to ensure the government and communities benefit from the project.	Annually	Construction & Operation Phases	Timely payment of taxes and contributions	Financial Officer	20,000
Capacity Building	The influx of a technically complex project will create opportunities for skills development, especially among local hires. This enhances long-term human capital in the area.	Sino Xinyuan Mining Company Limited will facilitate regular training and mentorship for local employees under the guidance of qualified experts. International and local trainers will work together to ensure sustained skills transfer.	Bi-Annually	Construction & Operation Phases	Number of locals trained and skills transferred	Training Coordinator	22,000

HIV/AIDS, Covid, STIs, Malaria	Worker influx increases the risk of disease transmission, including HIV/AIDS, COVID-19, STIs, and malaria. This can affect workforce health and spill over into surrounding communities.	Sino Xinyuan Mining Company Limited will implement a proactive health program, conduct regular health awareness campaigns, distribute protection kits, and coordinate with health authorities to provide screenings and vaccinations.	Monthly	Construction & Operation Phases	Reduced disease incidence; increased health screenings	Health Officer	15,000
Land Use and Loss of Agricultural Land	Land conversion for mining operations may displace agricultural activities, affecting food security and household income.	Sino Xinyuan Mining Company Limited will ensure fair and transparent compensation for affected farmers, as well as facilitate land-use planning consultations to limit negative impacts.	Quarterly	Construction & Operation Phases	Area of land affected; compensation effectiveness	Land Management Officer	18,000
Resettlement Impacts	Infrastructure development may necessitate relocation of some residents, affecting their social and economic stability.	Sino Xinyuan Mining Company Limited will conduct an inclusive resettlement process, ensuring displaced persons are adequately compensated, relocated, and integrated into suitable alternative areas with improved living standards.	Annually	Construction & Operation Phases	Successful resettlements and compensation packages	Resettlement Coordinator	25,000
Loss of Livelihood	Project development may disrupt farming, vending, and fishing activities that serve as primary sources of income for some community members.	Sino Xinyuan Mining Company Limited will design and implement livelihood restoration plans tailored to the needs of those affected, including training, start-up capital, and market access facilitation.	Bi-Annually	Construction & Operation Phases	Number of livelihood restoration programs implemented	Social Impact Manager	20,000

Loss of Customary Rights	The project may inadvertently impact traditional practices, cultural rites, or communal land rights.	Sino Xinyuan Mining Company Limited will recognize and uphold all traditional rights and customs. The company will carry out cultural sensitivity training for staff and ensure community leaders are engaged in all phases of project implementation.	Quarterly	Construction & Operation Phases	Number of cultural sensitivity sessions conducted	Community Liaison Officer	10,000
Road Safety	Increased traffic and heavy machinery movements can elevate the risk of road accidents for workers and local residents.	Sino Xinyuan Mining Company Limited will implement a Traffic Management Plan, ensure proper signage and road maintenance, and conduct driver safety training to minimize road safety risks.	Monthly	Construction & Operation Phases	Road safety compliance; reduced accident rates	Traffic Safety Officer	25,000
Hazardous Waste	Improper handling of hazardous waste could contaminate soil and water and pose serious health risks.	Sino Xinyuan Mining Company Limited will establish a robust hazardous waste management system, including waste segregation, containment, labeling, safe storage, training, and disposal by certified handlers.	Monthly	Construction & Operation Phases	Proper disposal of hazardous waste; compliance with regulations	Waste Management Coordinator	30,000
Air Pollution	Dust and exhaust emissions from construction and mining equipment can affect air quality and human health.	Sino Xinyuan Mining Company Limited will regularly water haul roads, service machinery, use dust collectors, and install emission control systems to ensure air quality standards are maintained.	Weekly	Construction & Operation Phases	Air quality levels; machinery emissions	Environmental Manager	20,000

Water Pollution	Runoff and accidental discharge may contaminate local water bodies, affecting aquatic ecosystems and human use.	Sino Xinyuan Mining Company Limited will install wastewater containment systems, conduct frequent water quality monitoring, and treat effluent to meet regulatory discharge standards.	Monthly	Construction & Operation Phases	Water quality standards compliance; effective waste containment	Water Resources Specialist	22,000
Groundwater Depletion	Intensive dewatering and water use may lead to depletion of groundwater reserves essential to the community and ecosystems.	Sino Xinyuan Mining Company Limited will install monitoring boreholes, conduct regular groundwater assessments, and apply water conservation technologies to ensure sustainable water use.	Monthly	Construction & Operation Phases	Groundwater levels; effectiveness of dewatering systems	Hydrogeologist	25,000
Siltation	Soil erosion and poor stormwater control may lead to siltation of nearby streams and rivers.	Sino Xinyuan Mining Company Limited will build sediment traps, vegetate disturbed areas, and implement erosion control practices to reduce soil loss and downstream sedimentation.	Monthly	Construction & Operation Phases	Reduced siltation levels; effectiveness of erosion control measures	Environmental Technician	18,000
Occupational Health and Safety	Mining activities pose physical and chemical risks to workers including injuries, respiratory illness, and heat stress.	Sino Xinyuan Mining Company Limited will implement a comprehensive OHS management system, conduct risk assessments, provide PPE, and ensure regular training and safety audits to maintain a safe working environment.	Monthly	Construction & Operation Phases	Compliance with safety regulations; reduced accident rates	Health & Safety Officer	28,000
Fire Risk	Equipment malfunction or poor handling of flammable materials could result in	Sino Xinyuan Mining Company Limited will install fire detection and suppression systems, conduct fire drills, and	Monthly	Construction & Operation Phases	Reduced fire incidents; effectiveness	Fire Safety Officer	15,000

	fires with loss of life or property.	ensure equipment is routinely maintained to minimize fire risks.			of fire safety measures		
Public Health and Safety	Poor sanitation, waste handling, and stagnant water could lead to waterborne disease outbreaks in communities.	Sino Xinyuan Mining Company Limited will install safe drinking water systems, disinfect surface water, conduct water quality testing, and promote hygiene awareness among workers and surrounding communities.	Monthly	Construction & Operation	Safe water quality and reduced incidence of waterborne diseases	Health & Safety Officer	20,000
Public Health and Safety	Increased mosquito breeding could heighten malaria incidence among workers and the community.	Sino Xinyuan Mining Company Limited will drain stagnant water, apply insecticides, distribute mosquito nets, and provide access to medical treatment through a project-supported clinic.	Bi-Annually	Construction & Operation	Decreased malaria cases and reduced mosquito breeding sites	Public Health Manager	15,000
Noise Pollution	Blasting, drilling, and vehicle movement can cause excessive noise and vibration, disturbing communities and wildlife.	Sino Xinyuan Mining Company Limited will restrict high-noise activities to designated hours, regularly service equipment, use low-noise explosives, and provide hearing protection to workers.	Monthly	Construction & Operation	Noise and vibration levels within permissible limits	Environmental Manager	25,000
Vibrations	Blasting may cause structural damage to buildings and infrastructure in nearby areas.	Sino Xinyuan Mining Company Limited will conduct geotechnical analysis before blasting, notify all stakeholders in advance, and use vibration-minimizing blasting technologies.	Per Blasting Event	Construction & Operation	Minimal structural damage and compliance with vibration standards	Mining Engineer	18,000

Fly Rocks	Improper blasting can result in fly rocks that endanger people and property.	Sino Xinyuan Mining Company Limited will mark danger zones, evacuate workers prior to blasting, and locate pits at a safe distance from settlements, supported by clear warning sirens.	Per Blasting Event	Construction & Operation	No injuries from fly rocks and effective evacuation	Safety Officer	12,000
Local Mass of Organisms	Land clearing and pit excavation may lead to the loss of vegetation and disruption of ecosystems.	Sino Xinyuan Mining Company Limited will limit land clearing to mineralized zones, preserve large trees, and support reforestation programs in collaboration with the Forest Department.	Annually	Construction & Operation	Preservation of large trees and increased tree planting efforts	Environmental Technician	22,000
Biodiversity	The project may lead to habitat fragmentation, loss of flora and fauna, and disruption of ecological networks.	Sino Xinyuan Mining Company Limited will implement a Biodiversity Management Plan, maintain species inventories, limit construction footprint, carry out rescue programs, and work with conservation groups to protect ecosystems.	Bi-Annually	Construction & Operation	Enhanced biodiversity conservation and reduced habitat loss	Biodiversity Specialist	30,000
Land Use Change	Prolonged mining may degrade soil and reduce land productivity post-closure.	Sino Xinyuan Mining Company Limited will implement a progressive rehabilitation plan, ensuring pits and waste dumps are reclaimed and vegetated during and after mine closure.	Annually	Operation Phase	Successful reclamation and minimal soil degradation	Reclamation Manager	18,000
Bio Magnification	Improper water management may cause accumulation of toxic	Sino Xinyuan Mining Company Limited will treat all mine effluents through settling ponds and chemical	Monthly	Construction & Operation	Compliance with water quality standards	Water Treatment Specialist	22,000

	heavy metals in the food chain.	neutralization before releasing water into the environment, ensuring compliance with national standards.					
Public Infrastructure Pressure	The growing population due to project employment may strain existing public services.	Sino Xinyuan Mining Company Limited will support local schools and clinics through donations, partnerships, and capacity-building efforts to ensure services remain accessible and efficient.	Bi-Annually	Construction & Operation	Improved infrastructure support in the area	Community Development Officer	25,000
Cultural Resources	Potential loss or damage of undocumented heritage or sacred sites.	No cultural resources are known on the project site. In case of chance finds, Sino Xinyuan Mining Company Limited will halt work and engage National Heritage Conservation Commission for evaluation.	N/A	N/A	N/A	N/A	N/A
Total Cost of ESMP Implementation:							546,000.00

7.2 Action Plan for Incidents and Accidents

7.2.1 Environment, Health and Safety (EHS)

Safety

The Safety manual will focus on identifying and eliminating or minimizing occupational safety and health risks. Sino Xinyuan Mining Limited management has the principal responsibility for safety, and all employees and contractors share an obligation for safety.

Aims

- Sino Xinyuan Mining Limited set and benchmark Safety Management Systems against international best practice
- Achieve Zero Fatality and Zero Lost Time Injuries (LTIs) status through continuation of Near miss capturing and closure management for all critical jobs

Objectives

- Ensure Identification, elimination or control of safety risks in the workplace and the environment
- Identifying training needs and fulfilment of scheduled training programs to ensure all jobs are performed by qualified and competent personnel
- Ensure compliance to all relevant guidelines and all Sino Xinyuan Mining Limited safe operating procedures, rules, through identification and implementation of all relevant legal and domestic standards/directives
- Ensure that Incident and Accident Investigations and Corrective Actions implementation are done through rigorous follow-up of actions and other interventions, identified from time to time
- Ensure an effective management of contractors and visitors at all the facilities through compliance to safety norms
- Ensure preparedness of emergencies in terms of fire prevention and firefighting capabilities
- Promote a positive safety culture by promoting an interactive safety management system on all levels of employees
- Encourage continuous improvement of safety management by recognition awards for outstanding safety performance/contributions through identification of outstanding safety performance in groups and individuals

Table 26 Action plan for probable accidents and incidents

Potential Accidents and Incidents	Prevention Measures	Management of Accidents and Incidents
Collapsing of waste rock dump, overburden, and topsoil stockpile	<ul style="list-style-type: none"> - Store materials safely and orderly. - Outline procedures for safe offloading. - Build rock walls to prevent collapse. - Install silt trap drains for containment. - Provide PPE: safety shoes, hard hats, gloves, reflective clothing. 	<ul style="list-style-type: none"> - Provide first aid and hospitalize injured personnel. - Inform relatives in case of fatalities. - Conduct a review meeting to prevent recurrence. - Arrange compensation for affected employees.
Slips, Trips & Falls	<ul style="list-style-type: none"> - Maintain clear, tidy work areas. - Clean spills promptly and cordon off hazardous areas. - Ensure adequate lighting. - Train workers for operations at heights and provide proper anchorage. - Install clear safety signs. - Provide PPE: safety shoes, hard hats, gloves, reflective clothing. 	<ul style="list-style-type: none"> - Provide first aid and hospitalize injured personnel. - Inform relatives in case of fatalities. - Conduct a review meeting to prevent recurrence. - Arrange compensation for affected employees.
Machines and Equipment Crashes	<ul style="list-style-type: none"> - Ensure only trained workers operate machinery. - Implement a checklist for faulty components. - Provide regular training and proper tools. - Provide PPE: safety shoes, hard hats, gloves, reflective clothing. 	<ul style="list-style-type: none"> - Provide first aid and hospitalize injured personnel. - Inform relatives in case of fatalities. - Conduct a review meeting to prevent recurrence. - Arrange compensation for affected employees.
Abnormal Spillages from the Silt Trap Drainage	<ul style="list-style-type: none"> - Design drainages to handle probable incidents. - Provide management guidelines and worker training. - Provide protective clothing. - Perform routine monitoring and preventive maintenance. - Use settling ponds and an outlet weir. - Implement a surveillance and maintenance program. 	<ul style="list-style-type: none"> - Call the rescue team and fire brigade in an emergency. - Assess failure extent and construct a temporary embankment. - Provide first aid and hospitalize injured personnel. - Inform relatives in case of fatalities. - Conduct a review meeting to prevent recurrence. - Arrange compensation for affected employees.

8.0 DECOMMISSIONING AND REHABILITATION PLAN

This phase will come at a point when the company no longer wishes to continue with the project due to various reasons, including change of use for the land, diminishing of raw materials, however the set time is 5 years. Below are some of the activities that will be taking place during decommissioning.

8.1 Guidelines for decommissioning, closure and rehabilitation

8.1.1 Copper Ore, Waste Rock and Mining Open pit mine

All the excavated waste rock will be used in the site reclamation process. The area will be rehabilitated to establish the natural outlook. This will be followed by Open pit mine and equipment dismantling, and good disposal practices will be applied which will include selling most of it to the scrap metal dealers and also the equipment which will be still in good condition will be sold to the existing and upcoming Open pit mines for copper mining: -

Other activities will involve the following:

- Removal of redundant electrical equipment, pumps, motors, and other fixed equipment including digging out the underground electrical cables
- Remove of all the pipework's and drainages
- Removal of the mechanical equipment and all the Open pit mine structures
- The soils which will be stockpiled will be Re-distributed and the decommissioning site manager will ensure re-vegetation programs of the site with indigenous grasses and trees
- General site clean-up.

Waste Rock and overburden

The waste rock and overburden material will be used to backfill the open pits and any excavated surfaces. This site reclamation process will involve landscaping procedures and forest re-germination activities in order recover the natural site outlook to the nearest possible extent.

Settlement Ponds and Site Drainage Systems.

After the final closure of the Open pit mine, all the settling pond silt will be tested for contamination. The results of this test work will indicate the measures needed to stabilise the silt to avoid additional contamination of the surface and groundwater. The settling ponds will be re-profiled with the addition of waste rock, previously stripped topsoil and organic matter and re-vegetated.

Contaminated Soil

All the contaminated soils after the survey will be collected and disposed of at the local council designated disposal Facility for further bioremediation or containment.

Public Safety

The hazardous areas will be fenced off and labelled as no entry areas using the billboards with necessary hazard signs and the public informed of the associated dangers of inadvertent site access after closure through the company's on-going public consultation program.

Social

The company endeavor to prepare its employees psychologically and also give them skills to survive outside formal employment. The company will ensure that the employees have socio-economic stability even after the closure of the Open pit mine.

Table 27 Decommissioning, Closure, and Rehabilitation

Aspect	Impact	Mitigation/Enhancement Measure (Sino Xinyuan Commitment)	Frequency of Monitoring	Time Frame	Performance Indicator	Responsible Person	Cost (ZMW)
Use of Excavated Waste Rock	Ineffective site reclamation	Use excavated waste rock to backfill open pits and rehabilitate the site.	Monthly	Decommissioning and Closure phase	Successful backfilling and site stabilization	Site Reclamation Manager	120,000
Equipment Dismantling	Environmental impact from discarded equipment	Dismantle equipment and sell to scrap dealers or other mines; remove redundant electrical equipment, pumps, and cables.	Bi-Annually	Decommissioning and Closure phase	Proper disposal of equipment and minimal environmental impact	Decommissioning Supervisor	150,000
Pipework and Drainages Removal	Hazard from remaining infrastructure	Remove all pipework and drainage systems.	Monthly	Decommissioning and Closure phase	Clean site with all pipework and drainages removed	Site Clean-Up Coordinator	100,000
Revegetation and Soil Management	Soil erosion and poor vegetation growth	Redistribute stockpiled soils; implement re-vegetation using indigenous grasses and trees; treat and use septic sludge.	Bi-Annually	Decommissioning and Closure phase	Successful vegetation growth and soil stabilization	Environmental Restoration Lead	45,000
Settlement Pond Management	Contamination of surface and groundwater	Test silt for contamination; stabilize silt; re-profile ponds with waste rock, topsoil, and organic matter; re-vegetate.	Quarterly	Decommissioning and Closure phase	Stabilization of silt and re-profiled ponds	Water Management Specialist	25,000

Contaminated Soil Disposal	Environmental contamination	Collect and dispose of contaminated soils at a local council facility for bioremediation or containment.	Annually	Decommissioning and Closure phase	Proper disposal and bioremediation of contaminated soils	Contaminated Soil Manager	30,000
Public Safety	Risk of public exposure to hazardous areas	Fence off hazardous areas, label with hazard signs, and inform the public through ongoing consultation programs.	Monthly	Decommissioning and Closure phase	Compliance with safety measures and reduced public incidents	Safety Officer	25,000
Employee Transition	Socio-economic instability for employees	Provide psychological support and skills training; ensure employees achieve socio-economic stability post-closure.	Annually	Decommissioning and Closure phase	Successful employee transition and socio-economic stability	HR and Training Coordinator	100,000
Total Cost							595,000.00

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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 Sino Xinyuan Mining 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:

SIGNATURE:

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 Open Pit Mine for Copper Under License No. 26238-HQ-LML in Kasisi Area Chongwe District, Lusaka Province by Sino Xinyuan Mining Company 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 (Sino Xinyuan Mining Limited) and others in respect of any matters outside the scope of the above.

Name:

Designation:

Signature:

11.0 APPENDICES

11.1 APPENDIX 1: CERTIFICATE OF INCORPORATION

CF45
(Regulation 46)
Companies Registration No. **120210015880**
Serial No. **1172587**



FOR FURTHER
DETAILS VISIT www.pacra.org.zm



Republic Of Zambia

The Companies Act, 2017

(Act No. 10 of 2017)

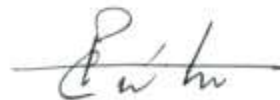
The Companies (Prescribed Forms) Regulations, 2018

(Section 14)

CERTIFICATE OF INCORPORATION COMPANY LIMITED BY SHARES

This is to certify that SINO XINYUAN MINING COMPANY LIMITED is on and from the
10th day of May 2021 incorporated as a COMPANY LIMITED BY SHARES.

Given under my hand and seal at Lusaka, Zambia, this **10th day of May 2021**.



P.C. Mwaba
Assistant Registrar of Companies

For further details relating to this business visit
<http://www.pacra.org.zm>

11.2 APPENDIX 2: LARGE SCALE MINING LICENSE

Changwe



REPUBLIC OF ZAMBIA

The Mines and Minerals Development Act, 2015
(Act No. 11 of 2015)
The Mines and Minerals Development (General) Regulations, 2016

LICENCE NO. 26238-HQ-LMI

LARGE-SCALE MINING LICENCE
(Section 32 of the Mines and Minerals Development Act, No.11 of 2015)

Holder's name: SINO XINYUAN MINING COMPANY LIMITED

Address: _____

The mining area shall be the area described in the Schedule and annexed hereto and bordered Red to the plan.

The licence relates to the following minerals: **Copper, Cobalt, Gold and Nickel**

The licence is granted for a period of **25 years** commencing on the **30th day of March, 2020**

The conditions of grant of the licence are as shown in the Annexures attached hereto.

issued at Lusaka on the **17th day of October, 2020**


.....
Samuel C. Maango
Director

ENDORSEMENT OF REGISTRATION
This Large Scale Mining Licence has on this **30th day of March, 2020** been registered in the Register.


.....
Samuel C. Maango
Director

11.3 APPENDIX 3: LETTER OF APPROVAL OF TORs



**ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY
RESPONSE LETTER**

08 Aug, 2025

{serial_no}

The Business Development Manager
Sino Xinyuan Mining Company Limited
Chalalobuka, Kasisi Road, Mission Area
CHONGWE

Mobile Number: +260962393691

Dear Sir/Madam

RE: APPROVED TERMS OF REFERENCE AND SCOPING REPORT FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED OPEN PIT MINE FOR COPPER UNDER LICENSE No. 26238-HQ-LML IN KASISI AREA CHONGWE DISTRICT BY SINO XINYUAN MINING COMPANY LIMITED

The above matter refers.

Zambia Environmental Management Agency (ZEMA) has reviewed the Terms of Reference (ToRs) and Scoping Report for the Environmental Impact Assessment for the proposed Open Pit Mine for Copper Under License No. 26238-HQ-LML in Kasisi Area Chongwe district by Sino Xinyuan Mining Company Limited. We would like to inform you that the said ToRs and Scoping Report have been approved.

The approved ToRs and EIA team members are as follows:

I. EIA Team Members

No	Name	Qualification	Position & Roles
1.	Eng Kelvin Mwansa	BEng. Environmental Engineering	Environmentalist/ Team Leader ESIA Coordinator and provider of Environmental Management Information
2.	Eng Rex Chaaba	BEng. Mining Engineering	Mining Engineer Reviewing of Geological and Mining methods, prediction of Mining related impacts.
3.	Eng. Chibwe Musonda	BEng. Environmental Engineering	Environmental Expert 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.
4.	Bwalya Kangwa	Diploma in Metallurgy	Metallurgist 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.
5.	Mr. Chilumba Mulenga	BSc. Biotechnology/Ecology	Ecologist The Ecologist will focus on the assessment of the Flora, Fauna, Aqua-flora and identify areas of high biodiversity on the site.
6.	Eng. Nathan Kaela	BEng. Chemical Engineering	Chemical Expert Evaluate air, water, and soil quality
7.	Mubanga Mutale	BSc. Economics	Social Economic Expert Socio-economic Scientist to undertake socio-economic community-based research.

ii. Approved Terms of Reference

The approved TORs include the following specialist studies:

- Socio-economic and Cultural Setup Study;
- Climate and Air Quality Study;
- Noise and vibration assessment;
- Land Use and Soil Study;
- Geology and Topography;
- Biodiversity (terrestrial and aquatic flora and fauna);
- Hydrology – ground and surface water;

You are advised to engage the Resettlement Department from the onset if the project is likely to lead to resettlements.

Please do not hesitate to contact the undersigned should there be any issue herein that may require clarification.

Yours faithfully,



Mr. Godfrey Mwiinga
Director General
ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

11.4 APPENDIX 4: MINUTES OF THE DISCLOSURE MEETING

MINUTES OF THE DISCLOSURE MEETING FOR THE PROPOSED COPPER OPEN PIT MINE PROJECT BY SINO XINYIAN MINING COMPANY LIMITED

Date: 08th August, 2025 **Location:** Kumena Basic School, Kasisi Area, Chongwe District **Time:** 09:00hrs to 12:30hrs

1. Introductory Remarks

The meeting was called to order. A welcome and introduction was provided to all attendees, which included relevant stakeholders. The purpose of the meeting was to communicate the key findings of the Environmental Impact Assessment (EIA) baseline study for the proposed project. The meeting agenda was outlined.

2. Presentation of EIA Findings by Eng. K. Mwansa

Project Overview: The proposed open-pit copper mine is located in the Kasisi Area of Chongwe District, approximately 40 km east of Lusaka's Central Business District. The site is accessible via the Great East Road and Kasisi Road. The project area is rural, with agriculture being the predominant land use. The Chongwe River is about 2.09 km south of the proposed mine pit, and the Chalalobuka Dam is also a significant water body in the area.

Key Environmental Findings:

- **Climate:** The project site is in Zambia's agro-ecological region IIa, with an annual rainfall of 800-1000mm and a growing season of 100-140 days.
- **Air Quality:** Baseline air quality is generally good. Major sources of air pollution are bush burning and dust from the unpaved Kasisi Mission road. The highest recorded concentrations of PM_{2.5} (0.0325 mg/m³), PM₁₀ (0.0558 mg/m³), and TSP (0.1203 mg/m³) were all below Zambian limits. Gaseous pollutants such as SO₂, NO_x, and CO were not detectable at any of the sampling points.
- **Geology and Hydrogeology:** The area is underlain by Precambrian metasediments. The water table is approximately 18 meters deep, with the groundwater at the mine site being

deeper, ranging from 40 to 50 meters. Productive potable water is found at depths of up to 40 meters.

- **Hydrology & Water Quality:** The drainage pattern flows towards the Chongwe River, which is 2.09 km south of the site. The Chalalobuka Stream is dammed and used for agriculture and domestic purposes. Water quality for the Chongwe River, Chalalobuka Stream, and groundwater is generally safe and complies with Zambian standards. All sources had heavy metal concentrations well below thresholds.
- **Soils:** The project area has clay soils in the east and sandy soils in the south. Soil fertility is moderate in the clay zones and lower in the sandy zones, with low levels of nitrogen and phosphorus. The soil pH is mildly acidic. Heavy metal concentrations are below international threshold values. The sandy soils are prone to erosion.
- **Biodiversity (Flora and Fauna):** The vegetation is Miombo woodland, with dominant tree genera including *Brachystegia*, *Julbernardia*, and *Isoberlinia*. No rare or endangered flora species were identified. Large mammal populations are depleted, but smaller mammals like rodents and monkeys persist. Common fauna include the Blue Monkey and Nile Monitor Lizard. The bird life is typical of Miombo woodlands, with species such as the Grey Go-away Bird and the Cattle Egret noted. No rare or endangered animal or bird species were found.
- **Noise:** The sound levels are low, typically below 45 dBA, which is consistent with its rural setting. The highest average noise was 47.2 dBA and the highest peak was 54.1 dBA, both recorded at the Kasisi Road Junction and below the 55 dBA limit for residential and rural areas.
- **Socio-Economic and Cultural Context:** The local economy is mainly based on small-scale agriculture. The area is under the traditional jurisdiction of Chieftainess Nkomeshya Mukamambo II. The

Chakwela Makumbi (rain-making ceremony) is a significant annual event. The project site is privately owned under leasehold tenure, with a portion leased to the Kasisi Farmers Trust. The project will change the land use from agriculture to mining.

3. Predicted Impacts and Mitigation Measures

Positive Impacts:

- **Economic Growth:** The project is expected to stimulate the local economy through job creation and increased demand for local goods and services.
- **Infrastructure Development:** The project may contribute to improvements in local infrastructure, such as roads and utilities.
- **Social Investment:** The company may invest in community projects, such as schools or health clinics, as part of its corporate social responsibility.

Negative Impacts & Mitigation:

- **Air Quality:** The mine's operations, including drilling, blasting, and vehicle movement, are expected to increase dust (particulate matter) emissions.
 - ✓ **Mitigation:** Dust suppression measures will be implemented, such as regular water spraying on roads and active mining areas, and covering haul trucks to prevent dust and material spillage.
- **Water Resources:** The mining activities may pose a risk of contamination to surface and groundwater resources, particularly the Chongwe River and Chalalobuka Dam, through acid mine drainage and chemical spills.
 - ✓ **Mitigation:** A water management plan will be put in place to manage runoff, and containment ponds will be constructed to treat and store process water. Regular monitoring of both surface and groundwater quality will be conducted.
- **Biodiversity:** The clearing of land for the mine pit and associated infrastructure will lead to a loss of vegetation and habitat for local fauna.
 - ✓ **Mitigation:** The project will minimize the footprint of the mine and establish buffer zones, especially around water bodies. A progressive rehabilitation plan will be implemented to restore mined-out areas with local plant species.
- **Noise and Vibration:** Blasting, heavy machinery, and truck traffic will increase noise levels, which could disturb nearby residents and wildlife.

- ✓ **Mitigation:** Controlled blasting schedules will be implemented during designated daytime hours. Equipment will be regularly maintained to reduce noise, and noise barriers or bunds may be used where necessary.
- **Socio-Economic:** The project will result in the displacement of agricultural land, affecting the livelihoods of local farmers.
 - ✓ **Mitigation:** A detailed Resettlement Action Plan (RAP) will be developed to identify and provide fair compensation to all Project-Affected Persons (PAPs). The company will prioritize local employment and provide skills training to community members.

4. Questions and Answers Session

1. **Mr. Alick Mwale (Local Resident):** How will the company ensure the safety of the Chongwe River and Chalalobuka Dam from mine runoff ?
 - ✓ **Answer by Eng. Mwansa:** A comprehensive water management plan will be implemented. This includes constructing containment ponds and settling dams to treat and manage mine runoff before it is discharged. We will also implement a robust monitoring program to regularly test water quality in both the river and the dam.
2. **Ms. Emeldah Kaiza (Local Resident):** For the farms that are close to the proposed mine site. What assurance do I have that my crops won't be affected by dust from the mine?
 - ✓ **Answer by Eng. Mwansa:** The EIA has identified dust as a key concern. We will implement strict dust suppression measures, including frequent water spraying on haul roads and at active mining faces. All haul trucks will be covered to prevent material and dust from escaping during transit.
3. **Mr. Brian Mwale (Local Resident):** What specific measures will be taken to ensure local residents are given priority for jobs created by the project?
 - ✓ **Answer by Eng. Mwansa:** The company is committed to local employment. A policy will be established to prioritize hiring from the local community, especially for jobs that do not require specialized skills. We will also conduct skills training programs for young people to prepare them for more technical roles.

4. **Ms. Hellen Mpula (Local Resident):** Will the increased noise and dust from the mine affect the learning environment at our school?
- ✓ **Answer by Eng. Mwansa:** We understand your concern. The school's proximity to the site is a key factor in our planning. We will control blasting schedules to occur outside of school hours and implement noise reduction measures on-site. The dust suppression plan mentioned earlier will also help minimize the impact on the school environment.
5. **Mr. Teddy Maliti (Local Resident):** The sandy soils are already prone to erosion. How will the mining activities prevent further soil erosion, especially during the rainy season?
- ✓ **Answer by Eng. Mwansa:** The project will implement erosion control measures, such as constructing diversion ditches and sedimentation ponds to manage surface runoff. We will also undertake progressive rehabilitation of disturbed areas by re-vegetating them with suitable plant species to stabilize the soil.
6. **Mr. John Kaluma (Local Resident):** What is the exact process for land acquisition and compensation for people who might be displaced by the project?
- ✓ **Answer by Eng. Mwansa:** The project will follow a formal and transparent process for land acquisition. A detailed **Resettlement Action Plan (RAP)** will be developed to identify all Project-Affected Persons (PAPs) and their assets. Fair and just compensation, as per national laws and international best practices, will be provided before any displacement occurs.
7. **Mr. Victor Ng'andu (Local Resident):** Will the company be involved in any community development projects, such as improving local schools or the rural health center?
- ✓ **Answer by Eng. Mwansa:** Yes, the company will have a Corporate Social Responsibility (CSR) program. We will engage with community leaders to identify priority projects, which could include support for schools, health centers, or other essential services.
8. **Mr. Rabson Daka (Local Resident):** What is the plan for rehabilitating the mine site after the mining operations are completed?
- ✓ **Answer by Eng. Mwansa:** The EIA includes a detailed mine closure and rehabilitation plan. This plan outlines the steps for progressively reclaiming the land, including backfilling the pit, re-sloping the land to a safe and stable condition,

and re-vegetating the area with native plant species to restore the ecosystem as much as possible.

5. Closing Remarks

- The meeting concluded with thanks to all participants for their input and feedback, which was deemed instrumental in shaping a comprehensive assessment.
- Eng. K. Mwansa, on behalf of Climax Environmental & Technical Services Ltd., thanked the attendees for their cooperation and participation

Prepared By: Chibwe Musonda

Date: 10/08/2025

Signature: 

11.5 APPENDIX 5: SIGNED LIST OF ATTENDEES FOR DISCLOSURE MEETING

DISCLOSURE MEETING ATTENDANCE LIST FOR THE PROPOSED OPEN PIT MINING OPERATIONS BY SINO XINYUAN MINING LTD.

No.	Name	Organization	Phone No.	Signature
01	Teddy C. Maluti	Katanga	0977320811	T. Maluti
02	Muzile Brain	Lima	09776088920	M. Brain
03	Hellen Mpala	Lima	0975635978	H. Mpala
04	Emeldah Kaibis	Kumama	0977448070	E. Kaibis
05	Alicia Kizale	Lima	0974186784	A. Kizale
06	Victor Ng'andu	Katanga	0977503517	V. Ng'andu
07	Nerer Hambayi	Lima	0977452966	N. Hambayi
08	Eraw Nyawali	Ward chair	0974461576	E. Nyawali
09	Musampala Joseph	Sino Xuyun	0971535121	M. Joseph
10	Sakala Rexica	Kumama	0967715556	S. Rexica
11	Dobby Mayo	Lima	0977303577	D. Mayo
12	John Kaluma	Kuzulu	0975286107	J. Kaluma
13	James M. Chumba	Community	097776710	J. Chumba
14				
15				
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11.6 APPENDIX 6: PICTURES OF STAKEHOLDERS DURING THE DISCLOSURE MEETING



11.7 APPENDIX 7: INVITATION LETTER FOR THE DISCLOSURE MEETINGS



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

24th July 2025

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 Open Pit Mine for Copper Under License No. 26238-HQ-LML in Kasisi Area Chongwe District, Lusaka Province by Sino Xinyuan Mining Company 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: 08th August, 2025.

Time: 09:00hrs to 12:30hrs

Location: Kumena Basic School, Kasisi Area, Chongwe 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

11.8 APPENDIX 8: ADVERT FOR THE DISCLOSURE MEETINGS

ZAMBIA DAILY MAIL

Wednesday, July 24, 2025

PUBLIC NOTICE

DISCLOSURE MEETING FOR ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Sino Xinyuan Mining Company Limited, through Climax Environmental and Technical Services, wishes to inform members of the public that a disclosure meeting will be held regarding the ongoing Environmental Impact Assessment for the proposed Open Pit Copper Mine under License No. 28238-HQ-LML in the Kasisi Area, Chongwe District, Lusaka Province.

Date: 08th August 2025
Time: 09:00hrs to 12:30hrs
Venue: Kumena Basic School, Kasisi Area, Chongwe District

Agenda:

- Welcome and Introduction
- Project Overview
- Presentation of Key Findings
- Mitigation/Enhancement Measures for Key Environmental Concerns
- Next Steps and Timeline
- Any Other Business

All interested and affected parties are encouraged to attend. For further clarification or information, please contact Climax Environmental at 0966 122 943 or climaxenvironmental@gmail.com

11.9 APPENDIX 8: WATER SAMPLES 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	SINO XINYUAN MINING COMPANY LIMITED	DATE SUBMITTED 31.07.25
ADDRESS	KASISI, CHONGWE DISTRICT	
SAMPLE DESCRIPTION	SURFACE AND UNDERGROUND WATER	
SERVICES REQUESTED	WATER ANALYSIS	

Parameter	Unit	Chongwe River	Chatalobuka Stream	Underground Water	Zema Limit
pH		7.5	7.1	7.8	6.0-9.0
Turbidity	NTU	12	15	1	≤15
Conductivity	µS/cm	480	350	620	≤4300
TSS	mg/l	18	22	5	≤100
TDS	mg/l	250	180	320	≤3000
SO4	mg/l	35	28	45	≤800
Cl	mg/l	42	35	50	≤800
NO3	mg/l	3.2	2.8	1.5	≤45
Fe	mg/l	0.18	0.22	0.1	≤2.0
Cu	mg/l	0.02	0.015	0.01	1.5
Co	mg/l	0.005	0.003	0.002	1
Pb	mg/l	0.01	0.008	<0.005	≤0.5
Mn	mg/l	0.06	0.04	0.03	1
Zn	mg/l	0.12	0.08	0.05	1
Ni	mg/l	0.01	<0.01	<0.01	≤0.5
As	mg/l	<0.005	<0.005	<0.005	≤0.5
Cd	mg/l	<0.002	<0.002	<0.002	≤0.5
Ca	mg/l	40	35	75	500
Mg	mg/l	15	12	25	500
Total Hardness	mg/l	160	130	280	500
Feacal Coliform	mg/l	25	18	0	≤5000
Total Coliform	mg/l	120	90	5	≤25000

Tests carried out in accordance with "Standards methods for the Examinations of water and wastewater APHA, 1998"

Authorising Officer's Approval:	Sign:	
	Name: DR J MUNDIKE	
Designation	Head of Department	

11.10 APPENDIX 9: APPROVED TORs WITH RESPECTIVE ATTACHMENTS

TERMS OF REFERENCE REPORT FOR THE PROPOSED OPEN PIT MINE FOR COPPER UNDER LICENSE No. 26238-HQ-LML IN KASISI AREA CHONGWE DISTRICT, LUSAKA PROVINCE.

**BY
SINO XINYUAN MINING COMPANY LIMITED**

Prepared By:

CLIMAX ENVIRONMENTAL AND TECHNICAL SERVICES LTD

KATILUNGU HOUSE

PLOT NO. 56J5+6HJ

OBOTE AVENUE

KITWE.

Tell: +260966122943. +260979844419

Email: climaxenvironmental@gmail.com

1.0 INTRODUCTION

Sino Xinyuan Mining Company Limited is a Zambian-registered mining company, incorporated on the 10th of May 2021, and currently engaged in copper exploration and Large-scale underground mining in Chongwe District, Lusaka Province. The company operates on Lot No. 2677/M, under License No. 26238-HQ-LML within the Kasisi area, and has been extracting copper ore through underground methods under a legally granted license. The mined ore is processed using on-site beneficiation techniques, producing copper concentrate for further refining. The company's operations are based on detailed geological data and historic drilling records originally compiled by exploration teams active in the area dating back to the 1960s. These datasets have enabled Sino Xinyuan to develop a precise understanding of the Kasisi ore bodies, particularly the East and West blocks. Building on the success of its initial underground mining operations, Sino Xinyuan is now seeking to expand and optimize its mining activities by transitioning to open pit mining within the Kasisi East ore body. This shift is intended to improve ore recovery, increase daily production capacity, and reduce operational complexity.

In view of this, Sino Xinyuan Mining Company Limited has commenced the process of conducting an Environmental Impact Assessment (EIA) for the proposed Open pit Mine for copper, in accordance with the environmental management act (EMA), S.I no. 12 of 2011 section 29, read together with the environmental impact assessment regulations of 1997, section 7 – 10 which require that Sino Xinyuan Mining Company Limited prepare an environmental impact statement and that before an EIS is prepared, a scoping meeting should be held to come up with terms of reference for the conducting of the environmental impact assessment. It is for this reason that these terms of reference have been prepared and submitted to the Zambia Environmental Management Agency (ZEMA) for approval before starting to conduct the EIA baseline studies.

The ToRs, once approved, will form the basis on which the EIA study will be undertaken, and the resulting Environmental Impact Statement (EIS) to be prepared for submission to ZEMA.

The EIA process will seek to identify environmental and social economic impacts associated with the proposed Open pit Mine for copper. These impacts will be identified through the collection of information and data on the environmental baseline such as:

- Water, soil, noise, air, fauna and flora (biodiversity) for both terrestrial and aquatic and on the socio-economic baseline aspects,
- Existing Schools and Healthcare facilities around the proposed project area,
- Prominent activities that communities living within the proposed project area are involved in, and
- Cultural and historical set ups of the communities within and around the proposed project site.

The EIA study will utilise scientific and social research methods to collect the baseline data. At each and every stage of the EIA process, the affected and interested parties will be consulted through public consultations.

Further, based on available data, key potential impacts that will require investigation during environmental baseline studies and potential impact identification and evaluation at different stages of the proposed project will include:

a. Preparation Phase

- Potential negative impacts due to dust and noise generation from site clearing and material hauling activities.
- Potential impacts on surface water quality and existing drainage regimes may be affected.
- Potential impacts on groundwater quality, its availability and effects on local aquifers.
- Potential impacts on soil, flora and fauna species within the project footprint.
- Potential impacts on occupation health and safety of personnel within and around the proposed project area.
- Types of waste materials expected to be generated and how they will be managed.

b. Operation Phase

- Potential excessive noise generation from aspects such as; blasting, machinery to be used, during operational activities.
- Potential impacts and sources of dust generation from aspects such as; trucks transporting copper ore, hauling and excavation activities.
- Potential impacts on surface and groundwater from aspects such as; Contamination of surface / ground water due to accidental leaks or spillages of fuel, and oil.

- Potential impacts on the occupational health and safety of employees due to Injuries/fatalities to personnel from operational activities, ambient air quality pollution, noise and vibrations during operation activities, risk of fire as well as surface and groundwater pollution.
- Potential generation of waste / hazardous waste in the form of used oil and lubricants from the use and servicing of equipment.
- The costs associated with adequately managing and mitigating identified impacts associated with the proposed Open pit Copper Mine project will also be calculated and included in the Environmental and Social Management Plan (ESMP) to be prepared.

c. Mine Decommissioning and Closure

- Potential noise and dust generation from site rehabilitation aspects will be identified and evaluated.
- Identification of different types of materials and wastes to be generated during Mine decommissioning activities and how they will be managed.
- Identification of alternative uses of facilities to be put up, after Mine closure.
- Identification of measures to be put in place after Mine closure and site rehabilitation activities to ensure the waste rocks materials do not pose a safety concern to the public.
- Calculation of the mine decommissioning and closure costs, to be incorporated in the Environmental and Social Management Plan (ESMP) to be prepared.

The topical issues listed above were identified based on the following studies and stakeholder feedback:

- Sino Xinyuan Mining Company Limited 's project feasibility studies.
- Initial meetings for the EIA study, between technical personnel from Sino Xinyuan Mining Company Limited and the project consultant (Climax Environmental and Technical Services Limited).
- Actual site visits undertaken by the developer from Sino Xinyuan Mining Company Limited and the consultant team from Climax Environmental and Technical Services Limited
- Comments/Concerns raised by attendees during the scoping meeting held on 4th July 2025 at Kumena Basic School.

d. Proposed Project Location

The proposed Kasisi East open pit copper mine is located in Chongwe District, approximately 40 km east of Lusaka Central Business District (CBD) and about 20 km from Kenneth Kaunda International Airport (KKIA). The project site lies within the Kasisi Area under the Large-scale mining license (No. 26238-HQ-LML). The project site is accessible via the Great East Road and Kasisi Road, with the final 2 km stretch branching off from a gravel road near Kasisi Mission. The Chongwe River lies approximately 2.09km south of the proposed pit, indicating the need for hydrological and environmental safeguards. The area is characterized by mixed-use rural development, with agricultural activities being predominant. The project will be implemented with attention to land-use coordination, stakeholder engagement, and environmental compliance.

The surrounding landscape includes:

- Kasenga Farm Block to the west and north,
- Kasenga B Cemetery 1.6 km north,
- Kasisi Area to the south.

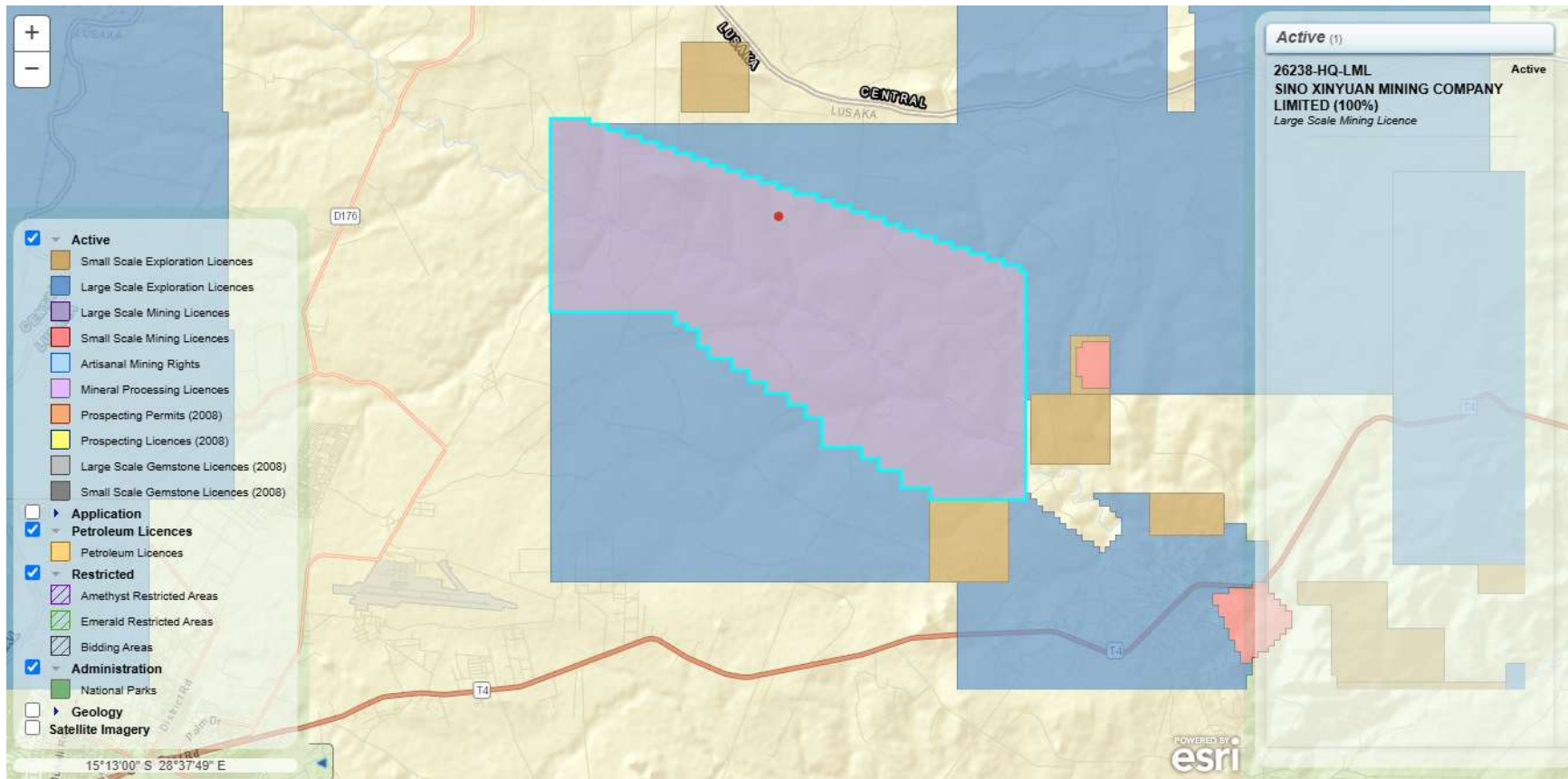
Key nearby developments include:

- Kumena Basic School (2.45 km north),
- CMML Church (2.5 km northwest),
- Farmhouses, sheds, cultivated fields, and center pivots used by Kasisi Farmers Trust within the proposed site boundary.

Table 28: Geographic Coordinates of the proposed project

Coordinates (WGS 84, Zone 35S)	
Latitude	Longitude
15°13'11.99"S	28°33'23.00"E
15°13'11.95"S	28°33'28.90"E
15°13'20.70"S	28°33'29.54"E
15°13'20.85"S	28°33'23.68"E

Figure 8 Proposed Project License area



NB: Project site in red dot Under the License Area (26238-HQ-LML)

Figure 9 Proposed Project Area



1.1 Project Background

1.1.1 Developer Background

Sino Xinyuan Mining Company Limited is a Zambian-registered mining company, incorporated on the 10th of May 2021, and currently engaged in copper exploration and Large-scale underground mining in Chongwe District, Lusaka Province. The company operates on Lot No. 2677/M, under License No. 26238-HQ-LML within the Kasisi area, and has been extracting copper ore through underground methods under a legally granted license. The mined ore is processed using on-site beneficiation techniques, producing copper concentrate for further refining. The company's operations are based on detailed geological data and historic drilling records originally compiled by exploration teams active in the area dating back to the 1960s. These datasets have enabled Sino Xinyuan to develop a precise understanding of the Kasisi ore bodies, particularly the East and West blocks. Building on the success of its initial underground mining operations, Sino Xinyuan is now seeking to expand and optimize its mining activities by transitioning to open pit mining within the Kasisi East ore body. This shift is intended to improve ore recovery, increase daily production capacity, and reduce operational complexity.

1.1.2 Ownership

Table 29 presents the shareholders and directors of Sino Xinyuan Mining Company Limited

Present forenames and surnames	Nationality	Identity Type	Identity Number	Director / Partner	Secretary	Shareholder / Member	Shares (%)	Actual Shares Amount
Xichun Zheng	CHINA	Passport	E18469815	Yes		Yes	30%	4,500
Haibo Zheng	CHINA	Passport	EH1404096	Yes		Yes	70%	10,500
Xuejiao Zeng	CHINA	Passport	E34042825	Yes	Yes	-	-	-

1.1.3 Details of the Contact Person

Name: Madelyn deng,

Designation: Business development manager

Contact Number: +260962393691

Physical Address: Chalalobuka, Kasisi Road, Mission Area, Chongwe, Lusaka Province, Zambia.

Email Address: madelyndeng@163.com

1.1.4 Project Components, Implementing Agents and Project Status

Project Components

Project components will include:

- A single Open Pit (1)
- Overburden Storage area

Areas Covered by Major Components

The proposed Open pit Copper Mine by Sino Xinyuan Mining Company Limited, will sit on Approximately 5 Ha under the Large-Scale Mining License area and the Overburden Storage area on about 4 Ha. Proposed project pit to be put up is expected to have the following design features:

Open Pit Design Features:

- Pit depth: 45 m
- Surface boundary: 256 m (length) × 218 m (width) = 45,338 m²
- Floor boundary: 218 m × 128 m = 14,764 m²
- Daily production target: 500–800 tonnes of ore
- Haul road gradient: 8–11%, turning radius: 15 m
- Safety berms: 5 m wide, 1 m high
- Bench face angles: 55–65°; hanging wall angles: 40–50°

Overburden Storage Area Features:

- square size with floor area 300*300 and top area 200*200, height 30 meters
- slope angle of this dump will be 31°

Total Area Coverage for All Infrastructures is about 85,338 square meters or 8.5338 Ha.

Proposed Project Design

The proposed mining operation will employ an Open Pit Mining Method, specifically a single-pit design, to extract copper ore from the Kasisi East ore body. This method has been selected due to the shallow depth of the ore, high ore grade, and the geometry of the deposit which favors surface mining over underground approaches. Open pit mining is more cost-effective for shallow, tabular or massive ore bodies and provides better access, safer working conditions, and greater operational flexibility. The operations will be carried out using face shovels in the waste areas and excavators with the assistance of front-end loaders and dozers to mine the ore zones. The equipment to be used will have the mobility to allow it to move from face to face if required. Ore and waste will be hauled using the haulage trucks to the ore storage facility and waste rock dumpsite respectively.

1.1.5 Volume, Grade and Production Rates

Volume and Grade of resource

Resource Characteristics (Kasisi East Ore Body):

- Ore zone area: 65,901 m²
- Average ore thickness: 3.43 m
- Average copper grade: 3.72% Cu

This will be mined over an estimated period of 5 years.

Production Rate

- Estimated ore volume: 565,101 tonnes
- Estimated contained copper metal: 21,000 tonnes
- Daily production target: 500–800 tonnes of ore

1.1.6 Proposed Project Infrastructure

Infrastructure and facilities to be put up at the proposed Open pit Mine project for copper will comprise of the following:

- A single Open Pit (1)
- Overburden Storage Area

1.1.7 Project Phases and Their Activities

Project phases and activities to be undertaken during the implementation of the proposed Open pit Mine for Copper will include the following:

- Site preparatory and construction/development phase;
- Operation phase; and
- Decommissioning and closure phase.

• Site Preparatory and Construction Phase

Site Preparation Phase

Activities in will include the following:

- Acquiring relevant papers from the council
- Environmental Impact assessments which is in progress
- Getting approvals from ZEMA
- Delivery of the construction materials on site
- Clearing of the site
- Recruitment and training of staff to the project tasks
- Removal of topsoil and any vegetation
- Marking the site for various Open pit mine design features

Construction/Development Phase

Generally, construction activities included the following:

- Clearing of vegetation and stripping of topsoil for stockpiling and future rehabilitation.
- Fencing the perimeter for safety.
- Construction of haul roads and pit access ramps.
- Installation of pit drainage and dewatering systems.
- Earthworks to shape berms and benches.
- Construction of the overburden storage area and silt drains around the area

- **Operation Phase Activities**

The Open pit mine will consist of the following activities:

The Open pit mine will consist of the following activities:

- Drilling and Blasting of Ore and Waste Rock
- Excavation and Haulage of Ore to ROM Pad
- Haulage of Waste Rock to Dumps
- Grade Control and Pit Wall Monitoring
- Pit Dewatering Operations
- Ore Crushing and Conveyance to Existing Processing Plant
- Ongoing Environmental Monitoring (air, water, noise, dust, biodiversity)
- Maintenance of Pit Infrastructure and Haul Roads
- Fleet Management and Equipment Servicing
- Use of Existing Support Infrastructure (workshops, clinics, accommodation, etc.)
- Waste Management (hazardous and non-hazardous)
- Health, Safety, and Environmental (HSE) Oversight

- **Decommissioning and Closure Phase**

The decommissioning and closure phase of mining activities shall include the following:

- Final Backfilling (if planned) or Safe Closure of Pit
- Removal of Temporary Structures and Equipment
- Dismantling and Rehabilitation of Haul Roads
- Covering and Stabilization of Waste Rock Dumps
- Revegetation using Stockpiled Topsoil
- Water Quality Management and Long-Term Monitoring
- Slope Stabilization and Safety Berm Reinforcement
- Installation of Long-term Drainage and Sediment Control Measures
- Demobilisation of Equipment
- Post-closure Land Use Planning in Consultation with Stakeholders
- Socio-economic Transition Support for Affected Communities

Should there be evidence of contamination, then appropriate remedial measures will be instituted and an Environmental Impact Assessment (EIA) for decommission of the Mine will be prepared and submitted to ZEMA for consideration of the project. Putting into consideration all activities and tasks of phase 3, decommissioning and closure costs shall be determined.

1.1.8 Implementing Agents

The proposed Open pit Mine for copper will be implemented within the Zambian legal and administrative framework. It will also be implemented to conform to international conventions and international best practices outlined in the Equator Principles (EP), the 2012 version of the International Finance Corporation (IFC) Performance Standards and Environment Health and Safety (EHS) Guidelines.

1.1.9 Project Background and Status

Sino Xinyuan Mining Company Limited is proposing the development of a new open pit copper mine targeting the Kasisi East ore body, located within the company's existing license area, 26238-HQ-LML in Kasisi, Chongwe District. The proposed development marks a progression from its current underground operations to a surface mining method designed to extract ore more efficiently. The transition to open pit mining is aimed at enhancing operational safety and productivity while optimizing the recovery of high-grade copper from near-surface ore zones. Sino Xinyuan Mining Company Limited is committed to implementing this project in compliance with Zambia's environmental and mining regulations, supported by appropriate environmental management plans (EMPs), stakeholder engagement, and long-term monitoring frameworks.

Overview of the Proposed Development:

- Type of development: Open pit copper mine (single pit)
- Location: Kasisi area, Chongwe District, Lusaka Province
- Current status: Underground mining and processing ongoing
- Proposed upgrade: Transition to open cast mining on the Kasisi East deposit

Resource Characteristics (Kasisi East Ore Body):

- Ore zone area: 65,901 m²
- Average ore thickness: 3.43 m
- Average copper grade: 3.72% Cu
- Estimated ore volume: 565,101 tonnes
- Estimated contained copper metal: 21,000 tonnes

Open Pit Design Features:

- Pit depth: 45 m
- Surface boundary: 256 m (length) × 218 m (width) = 45,338 m²
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- Daily production target: 500–800 tonnes of ore
- Haul road gradient: 8–11%, turning radius: 15 m
- Safety berms: 5 m wide, 1 m high
- Bench face angles: 55–65°; hanging wall angles: 40–50°

1.1.10 Objectives and Scope of the Terms of Reference (TORs)

The main objective of these ToRs is to ensure that the Environmental Impact Assessment (EIA) study addresses all the environmental and social impacts identified during the scoping exercise conducted in accordance with the requirements of the EIA regulations, S.I No. 28 of 1997. Regulation 8 (3) states that “*the developer shall prepare Terms of Reference taking into account issues contained in third schedule and the results of the consultations undertaken under sub-regulation (2) and submit these to the Council for approval*”. The primary focus of the ToRs is that it will later be used to identify baseline topical areas and propose methodologies to be used for baseline studies and data collection based on the outcomes from questions and concerns raised from the scoping and the public consultative meetings reports.

The Terms of Reference (ToRs) is prepared on behalf of Sino Xinyuan Mining Company Limited to guide the Environmental Impact Assessment (EIA) process for the proposed development of a new open pit copper mine targeting the Kasisi East ore body, located within the company’s existing license area, 26238-HQ-LML in Kasisi, Chongwe District.

The purpose of these ToRs is to define the scope, objectives, and methodology for conducting the EIA, including the nature and extent of baseline studies, identification and evaluation of environmental and social impacts, and proposed mitigation and management measures. This document identifies the type, nature, and scope of data that will be collected, as well as the technical and stakeholder engagement processes to be followed

In order to develop these ToRs, Sino Xinyuan Mining Company Limited Commissioned Climax Environmental and Technical Services Limited to undertake an environmental and socio-economic scoping meeting within the project area and surrounding communities, where key stakeholders were consulted with regards to the proposed open pit copper mine Project.

The methodology of how concerns from interested and affected parties were collected has been described in section 5 of this report and a list of those that attended the scoping meeting is attached in appendices of the scoping report, submitted with the ToRs to ZEMA for consideration.

Thus, this report will provide a description of the following aspects:

- Data collection mechanisms,
- Baseline topic studies to be undertaken, and

- Identification of areas for the analysis of project alternatives like technology, materials as well as land use options including the zero alternative.
- The ToRs also propose potential environmental and social-economic impacts of the proposed Open pit Mine project for copper to be analyzed and the format for which the resulting EIS will be written.

1.1.11 Proposed Project Categorisation

The overall objective of the EIA study is to identify the significant potential environmental stresses and propose acceptable mitigating measures in conformity with the Environmental Management Act, SI No. 12 of 2011 section 29, read together with the Environmental Impact Assessment Regulations of 1997, section 7 – 10 which stipulates that *“a developer shall not implement a project for which a project brief or environmental impact statement is required under these Regulations, unless the project brief or the environmental impact statement has been concluded in accordance with these regulations and the Council (Zambia Environmental Management Agency) has issued a decision letter.”*

Further, these regulations require that before EISs are prepared, scoping meetings should be held to come up with Terms of Reference (ToRs) that will form the basis of the subsequent EIA process to be undertaken.

Thus, these ToRs form the basis on which the preparation of the proposed Open pit Mine project for copper EIA will be undertaken, in accordance with the Environmental Management Act, SI No. 12 of 2011 section 29, read together with the Environmental Impact Assessment Regulations of 1997, section 7 – 10.

Schedules 1 and 2 of the Environmental Impact Assessment Regulations of 1997 provide criteria for establishing whether a project needs a full EIA or not. Schedule 1 lists projects for which an Environmental Project Brief (EPB) is mandatory, if the size of the proposed project and the sensitivity of the environment warrant it. Schedule 2 lists projects for which full EIA is mandatory in all cases. In this case, the proposed Open pit Mine project for copper falls under Schedule 2 – requiring that a full EIA be carried out and an Environmental Impact Statement (EIS) be prepared and submitted to ZEMA for consideration of the proposed project.

2.0 Relevant Policy, Legislative and Planning Framework

This section discusses relevant policy, legal and institutional frameworks and company policies for the proposed Open pit Mine for Copper by Sino Xinyuan Mining Company Limited under the License No. 26238-HQ-LML.

2.5 Policy Framework

2.5.1 National Environmental Policy

The Government has developed a National Policy on Environment to avoid conflict of interest, harmonise sectoral strategies, and rationalise 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 recognises 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: Sino Xinyuan Mining Company Limited will strive to manage its environment in line with the National Environmental Policy as evidenced by the development of the company's environmental policy and preparation of documents such as EIS.

Compliance: Sino Xinyuan Mining Company Limited will adhere to the national environmental policy in the management of the environment.

2.5.2 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 Open pit Mine for Copper project by Sino Xinyuan Mining Company Limited. One specific environmental policy objective is to reduce the danger of ecological damage arising from mining operations as well as damage to 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 provides 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: The proposed Open pit Mine for Copper project is a mining related project, hence falls within the confines of the Mining Policy.

Compliance: Sino Xinyuan Mining Company Limited will ensure that all the new developments are undertaken in line with the Mining Policy. Sino Xinyuan Mining Company Limited will conduct the proposed development in consultation with the ministry of mines and all the relevant stakeholders under the mining policy.

2.5.3 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 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: Sino Xinyuan Mining Company Limited Proposed Open pit Mine for Copper project may interact with the water resources that are within the spheres of the National Water Policy.

Compliance: Sino Xinyuan Mining Company Limited will continue to engage with the Department of Water Resource Development and the Water Resources Management Authority (WARMA) to ensure that the National Water policy is adhered to during the implementation of this project.

2.6 Legal Framework

2.6.1 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 minimize 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: Section 29 subsection (1) of the Act states that “A person shall not undertake any project that may have an effect on the environment without the written approval of the Agency, and except under any conditions imposed in that approval.” Section 30 subsection 2 (a) of the Act states that “the categories of projects that are considered to have an effect on the environment for subsection (1) of section twenty-nine and are required to conduct environmental impact assessments”. This ESIA was being done in compliance with the EMA read together with the EIA Regulations.

Compliance: Sino Xinyuan Mining Company Limited has appointed an independent consultant to undertake the ESIA to comply with the EMA Act before the implementation of the proposed project.

2.6.2 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 (Amendment) Act, 2022).

Relevant mining subsidiary legislation was developed in the 1990s to ensure that environmental management practices were carried out within industry for old, existing and new projects as part of the old Mines and Minerals Act (repealed by the MMDA, 2022).

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: An Open pit Mine for Copper project is directly relevant to the Mines and Minerals Development Act (MMDA) No. 29, 2022 because the Act requires a mineral processing license for such operations, ensuring compliance with regulatory, environmental, and safety standards. Additionally, the plant must adhere to subsidiary legislation like SI No. 29 of 1997 (mandating EIAs and audits) and SI No. 102 of 1998 (governing the Environmental Protection Fund), which enforce pollution control, financial assurances, and rehabilitation measures. The MMDA and its related regulations ensure that the plant operates within legal frameworks for licensing, environmental management, and fiscal obligations.

Compliance: Sino Xinyuan Mining Company Limited will ensure that it implements the project in line with the requirements of the Mining and Minerals Development Act by ensuring that environmental assessment is thoroughly conducted before project implementation.

2.6.3 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: Sino Xinyuan Mining Company Limited subjects to all its works through the process for fitness certification. All workers will be subjected to mandatory examinations in line with the act.

2.6.4 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: Section 72 (3) states that a person holding a permit or a license under the Mines and Minerals Development Act, 2008 who requires the use of water for mining purposes, shall make an application to the Director of Mines, setting out the volume of water required, the nature of the proposed use and such other information as may be prescribed. Section 72 (4) states that the Director of Mines shall cause an inquiry to be made into the merits of the application, made under subsection (3) and shall thereafter forward the application with comments and recommendations to the Director-General, catchment council, sub catchment council or water users association for consideration. Section 150 (v) provides for charges for any dewatering activities for any mining and industrial activities.

Compliance: This project is within the Chalalobuka Stream and Chongwe River water bodies catchment. The Act provides for the conservation and protection of such waterbody systems. Sino

Xinyuan Mining Company Limited will ensure that WARMA and the Department of Water Resource Development are involved during the project planning and implementation stages as well as for all the water needs of the company.

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

This Act is to provide for the establishment of the Agricultural Lands Board; to prescribe the composition and membership thereof; to prescribe its powers and functions; to provide for tenant farming schemes; and to provide for matters incidental to or connected with the foregoing

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.

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

2.6.6 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: Section 6 (3) of the Act mandates that any discharge between water types whether subsoil, surface, storm, rainwater, sewage, or wastewater must only occur with written permission or under the direction of the Local Authority. It specifically requires that natural water discharges be released directly into the open air over a controlled, elevated area, preventing mixing with sewage or wastewater. If these regulations are not properly followed in the project, it could lead to improper handling of water materials, creating potential public health hazards.

Compliance: Sino Xinyuan Mining Company Limited will continue to work with all relevant stakeholders to ensure that public health hazards related to the processing operations are identified early and mitigated.

2.6.7 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 Chongwe district under the auspices of 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. Sino Xinyuan Mining Company Limited will, therefore, coordinate with the council in ensuring that the project is implemented in line with the mandate of the council.

2.6.8 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.

2.6.9 The Land Act and Land Acquisition Act

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: Section 3 of the Lands Acts provides that all powers over land in Zambia is vested in the president who acts on behalf of the Zambians and the president may alienate the land vested in him to any Zambian and non-Zambian individuals or companies who qualifies.

Section 4 also provides that the President shall not alienate any land situated in a district or an area where land is held under customary tenure without taking in consideration the local customs of the area, consulting the Chief and local authorities. For any project development, Land ownership and compensation are critical items.

Compliance: Sino Xinyuan Mining Company Limited will continue adhering to the provisions of the acts on land management.

2.6.10 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: The Act is relevant for known and unknown relics and objects of aesthetic, historical, pre-historical, archaeological or scientific interest which may be found within the Project area. Section 1 of the Act provides for the establishment of the Commission and Section 8 provides for the functions of the NHCC that includes preservation of archaeological artefacts and other national heritages.

Compliance: Sino Xinyuan Mining Company Limited will work closely with NHCC in implementing the proposed project.

2.6.11 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: Part II of the Forest Act establishes the Forestry Department within the government system as well as its functions. Part III provides for the management and development of the forests – National, Local Forests and Botanical reserves.

Compliance: The project implementation will be implemented in a way to protect and preserve the vegetation in the nearby areas to encourage the development of forests where possible.

2.6.12 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: Section 4 of the act establishes the Occupational Health and Safety Institute while Section 6 provides for the functions of the institute that include conducting medical examinations for occupational health and safety purposes in workplaces. Section 11 under Part III states that an employer of ten or more persons at any workplace shall establish a health and safety committee. The project will employ some persons to perform these functions during all project stages.

Compliance: The project will protect all workers at the project site from the various health and safety risks associated with the activities. Sino Xinyuan Mining Company Limited will establish a safety and health system on site in line with the act.

2.6.13 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: Section 41 under Part V of the Act provides that if an accident to a worker arising out of and during his employment happens after the date of commencement and results in such worker's disablement or death, he, or if he dies, his dependants, shall become entitled to compensation in accordance with the provisions of this Act.

Compliance: The project will employ some persons to perform some functions during all project stages. The project will protect all workers at the project site from the various health and safety risks associated with the activities.

2.6.14 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: Part III of the Act provides for the employment relationship subdivided in divisions – contract of employment, minimum employment benefits, suspension/termination of employment, employment of expatriates and skills advisory committee. The project will employ some persons to perform some functions during all project stages. These employees will need to be protected in line with the provisions of the Act.

Compliance: Sino Xinyuan Mining Company Limited will ensure that it follows all the necessary procedures required for employment.

2.6.15 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: Part II provides for the classification of the roads system in Zambia. Part III provides for construction and maintenance of the roads system in Zambia. The Developer may require upgrading some roads for easier access to the proposed project site.

Compliance: Sino Xinyuan Mining Company Limited will ensure that all the roads work in the area is done in line with the Act.

2.6.16 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: The Open pit Mine for Copper project at Sino Xinyuan Mining Company Limited, The Project Area is served by Great East Road (T4) Road that happen to be a busy road. Therefore, road safety is of paramount importance to the safety and wellbeing of other road users.

Compliance thereof: All haulage vehicles to the site, during both the construction and operational phases, as well as transport ferrying workers to and from the Mine will comply with minimum speed limits to ensure the safety and wellbeing of other road users.

2.6.17 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 Aquaculture Development Fund; repeal and replace the Fisheries Act, 1974; and provide for matters connected with, or incidental to, the foregoing

Relevance: The Act in its entirety provides for promotion, 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 Aquaculture Development Fund.

Compliance: The proposed project might have an influence on the fisheries management directly or indirectly. Sino Xinyuan Mining Company Limited will ensure that the company manages its operations in such a manner that does not affect the fisheries or fish breeding areas.

2.6.18 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: Part II of the act establishes the National Water and Sanitation Council (NWASCO) tasked with the responsibility of regulating the water and Sanitation sector. Section 11 provides for the licensing of the utilities and services provider in the water and sanitation sector. The proponent will need to provide water and sanitation facilities to the workers at the proposed development.

Compliance: The developer will ensure that the Act is adhered to by providing appropriate and adequate sanitation services to the workers while working together with the local authorities.

2.6.19 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: Section 4 of the Act provides that any person who erects or establishes a power generation station will do so in line with the requirements of the Act. Sino Xinyuan Mining Company Limited will need electricity for the proposed project to run.

Compliance: The developer will ensure that all the electricity needs are done in line with the Act.

2.6.20 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. Sino Xinyuan Mining Company Limited will need to produce its own electricity to ensure smooth operations using generators.

Compliance: Sino Xinyuan Mining Company Limited will operate the onsite generators and handle fuels in line with the Act.

2.6.21 The Ionising Radiation Protection Act

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: Part II of the Act establishes the Radiation Protection Authority (RPA). RPA is a statutory Body in the Ministry of Health (MoH) established by the Government of the Republic of Zambia through an act of parliament No. 16 of 2005. Its main functions and powers are to provide for the protection of the public, patient and environment from hazards arising from the use of devices or materials capable of producing ionising radiation. Part IV provides for the application and issuance of the licenses by RPA to various institution that handle radiation and related substances.

Compliance: In an event that Sino Xinyuan Mining Company Limited used process measurement instruments that are sources of ionizing radiation, the company will ensure that such as registered RPA.

2.6.22 Chiefs Act

This is an Act to make provision for the recognition, appointment and functions of Chiefs and Deputy Chiefs, for the exclusion of former Chiefs and Deputy Chiefs from specified areas in the interests of public order, for the appointment and functions of Chief's Retainers and for matters incidental to or connected with the foregoing (Chiefs Act CAP 287, n.d.).

Relevance: The chief has customary authority over the land of the project area as provided for under Section 4(a) of the Act which states "area; about a Chief, means the area in Zambia within which recognition is accorded to the Chief under this Act".

Compliance: The proposed project is under the traditional authority of Chieftainess Nkomeshya Mukamambo II.

2.7 Institutional Framework

2.7.1 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.

2.7.2 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 led 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.

2.7.3 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.

2.7.4 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.

2.7.5 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.

2.8 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.

2.8.1 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: This Convention applies directly to the proposed project by Sino Xinyuan Mining Company Limited in that the area is predominantly surrounded by water bodies.

Compliance thereof: Sino Xinyuan Mining Company Limited will comply with this convention by ensuring that all effluent from the leaching plant operations meets the ZEMA stipulated standards and by managing, as well as preventing siltation and hydrocarbon leaks in the ground or surface waters in these two surface water bodies.

2.8.2 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: Some activities associated with the proposed project at Sino Xinyuan Mining Company Limited will take place on land that is relatively virgin. This is likely to result in loss of habitat for some species of fauna, or loss of vegetation cover. Thus, site clearing and excavation activities are expected to have a certain degree of impact on the diversity of fauna and flora species within the area.

Compliance thereof: Sino Xinyuan Mining Company Limited will comply with this Convention by limiting site clearing and excavation activities during project implementation to areas earmarked for such activities. Further, all excavated topsoil will be heaped at the overburden dump that will be progressively re-vegetated.

2.8.3 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: During the copper processing operation, emissions (greenhouse gas, e.g. CO₂, CO, SO₂) will be produced which has the potential to contribute to climate change.

Compliance thereof:

Sound and well-maintained vehicles and machinery will be used to transport materials to the site during both the construction and operational phases of the proposed project. This will greatly minimize the risk of carbon monoxide and carbon dioxide emissions to the atmosphere.

3.0 PROJECT DESCRIPTION

3.1 Project Overview

Sino Xinyuan Mining Company Limited is proposing the development of a new open pit copper mine targeting the Kasisi East ore body, located within the company's existing license area, 26238-HQ-LML in Kasisi, Chongwe District. The proposed development marks a progression from its current underground operations to a surface mining method designed to extract ore more efficiently. The transition to open pit mining is aimed at enhancing operational safety and productivity while optimizing the recovery of high-grade copper from near-surface ore zones. Sino Xinyuan Mining Company Limited is committed to implementing this project in compliance with Zambia's environmental and mining regulations, supported by appropriate environmental management plans (EMPs), stakeholder engagement, and long-term monitoring frameworks.

Overview of the Proposed Development:

- Type of development: Open pit copper mine (single pit)
- Location: Kasisi area, Chongwe District, Lusaka Province
- Current status: Underground mining and processing ongoing
- Proposed upgrade: Transition to open cast mining on the Kasisi East deposit

Resource Characteristics (Kasisi East Ore Body):

- Ore zone area: 65,901 m²
- Average ore thickness: 3.43 m
- Average copper grade: 3.72% Cu
- Estimated ore volume: 565,101 tonnes
- Estimated contained copper metal: 21,000 tonnes

Open Pit Design Features:

- Pit depth: 45 m
- Surface boundary: 256 m (length) × 218 m (width) = 45,338 m²
- Floor boundary: 218 m × 128 m = 14,764 m²
- Daily production target: 500–800 tonnes of ore
- Haul road gradient: 8–11%, turning radius: 15 m
- Safety berms: 5 m wide, 1 m high
- Bench face angles: 55–65°; hanging wall angles: 40–50°

3.1.1 Mining Operation Method

The proposed mining operation will employ an **Open Pit Mining Method**, specifically a **single-pit design**, to extract copper ore from the Kasisi East ore body. This method has been selected due to the shallow depth of the ore, high ore grade, and the geometry of the deposit which favors surface mining over underground approaches. Open pit mining is more cost-effective for shallow, tabular or massive ore bodies and provides better access, safer working conditions, and greater operational flexibility.

Key Pit Design Parameters

Table 30 Key Pit Design Parameters

Parameter	Value
Pit Depth	45 meters
Surface Dimensions	256 m (L) × 218 m (W)
Floor Dimensions	218 m × 128 m
Ore Body Thickness (avg.)	3.43 meters
Average Ore Grade	3.72% Cu
Total Ore Volume	~565,101 tonnes
Estimated Contained Copper	~21,000 tonnes
Haul Road Gradient	8–11%
Turning Radius	15 meters
Bench Face Angle	55–65°
Safety Berms	5 m wide, 1 m high

Open Pit Mining Operation Process

- **Site Preparation**
 - Clearing of vegetation and stripping of topsoil for stockpiling and future rehabilitation.
 - Fencing the perimeter for safety.
 - Construction of haul roads and pit access ramps.
 - Installation of pit drainage and dewatering systems.
 - Earthworks to shape berms and benches.
- **Drilling and Blasting**

- Controlled drilling of blast holes using rotary drills along ore zones.
- Placement of explosive materials (ANFO) in designated holes.
- Sequential blasting of rock to fragment the ore and waste material.
- Adherence to safety protocols to minimize vibration and flyrock.

NB: the blasting will be minimal as the ore material is near the surface about 10 m.

- **Excavation and Haulage**

- Front-end loaders or hydraulic excavators will load fragmented ore and waste into dump trucks.
- Ore is transported to the **existing processing plant**, while waste is hauled to designated **waste rock dumps**.
- Haulage routes will be designed for optimal efficiency and minimum fuel consumption.

- **Grade Control**

- Sampling and in-pit assays will be performed to distinguish ore from waste.
- A grade control geologist will guide shovel operators to minimize ore loss and dilution.

- **Dewatering**

- Submersible pumps and boreholes will manage groundwater inflow.
- Settling ponds and lined drainage systems will be used to contain and treat pit water.

Material Handling

- **Ore Handling:** Crushed ore is conveyed from the ROM pad to the existing beneficiation facility for further processing into copper concentrate.
- **Waste Rock Management:** Waste material is transported to engineered dumps located at safe distances from the pit. Dumps are compacted and shaped with berms to prevent erosion and facilitate future rehabilitation.
- **Topsoil Management:** Stripped topsoil is stored separately from overburden and preserved for use in final pit rehabilitation.

Safety and Operational Controls

- Highwall monitoring to detect ground movement.
- Use of safety berms at bench edges.
- Speed limits and traffic management within the pit.
- Personal protective equipment (PPE) and mandatory safety training.
- Blasting notifications and exclusion zones enforced before each blast.

Environmental Considerations

- Dust suppression using water bowsers on haul roads.
- Runoff management through channeling and sedimentation ponds.
- Progressive rehabilitation of waste dumps and disturbed areas.
- Monitoring of air, water, and noise quality as per ZEMA guidelines.

Equipment Summary

Table 31 Equipment to be utilised for the mining operations

Equipment	Purpose
Hydraulic Excavators	Excavation of blasted material
Dump Trucks (30–50 tonnes)	Ore and waste transportation
Rotary Drills	Blast hole drilling
Bulldozers & Graders	Road and dump maintenance
Dewatering Pumps	Groundwater control
Water Bowsers	Dust suppression

Life of Mine (initial estimate is 5 years): Based on ore body geometry and production rate, expected to support several years of operations before depletion.

3.1.2 Production capacity

- Estimated ore volume: 565,101 tonnes
- Estimated contained copper metal: 21,000 tonnes
- Daily production target: 500–800 tonnes of ore

3.2 Location of the proposed project.

The proposed Kasisi East open pit copper mine is located in Chongwe District, approximately 40 km east of Lusaka Central Business District (CBD) and about 20 km from Kenneth Kaunda International Airport (KKIA). The project site lies within the Kasisi Area under the Large-scale mining license (No. 26238-HQ-LML). The project site is accessible via the Great East Road and Kasisi Road, with the final 2 km stretch branching off from a gravel road near Kasisi Mission. The Chongwe River lies approximately 2.09km south of the proposed pit, indicating the need for hydrological and environmental safeguards. The area is characterized by mixed-use rural development, with agricultural activities being predominant. The project will be implemented with attention to land-use coordination, stakeholder engagement, and environmental compliance.

The surrounding landscape includes:

- Kasenga Farm Block to the west and north,
- Kasenga B Cemetery 1.6 km north,
- Kasisi Area to the south.

Key nearby developments include:

- Kumena Basic School (2.45 km north),
- CMML Church (2.5 km northwest),
- Farmhouses, sheds, cultivated fields, and center pivots used by Kasisi Farmers Trust within the proposed site boundary.

Table 32: Geographic Coordinates of the proposed project

Coordinates (WGS 84, Zone 35S)	
Latitude	Longitude
15°13'11.99"S	28°33'23.00"E
15°13'11.95"S	28°33'28.90"E
15°13'20.70"S	28°33'29.54"E
15°13'20.85"S	28°33'23.68"E

Figure 10 Shows the Proposed Project Area of the Open pit Copper Mine.



3.3 Size of the Area covered by the proposed project

The proposed Open pit Copper Mine by Sino Xinyuan Mining Company Limited, will sit on Approximately 5 Ha under the Large-Scale Mining License area and the Overburden Storage area on about 4 Ha. Proposed project pit to be put up is expected to have the following design features:

Open Pit Design Features:

- Pit depth: 45 m
- Surface boundary: 256 m (length) × 218 m (width) = 45,338 m²
- Floor boundary: 218 m × 128 m = 14,764 m²
- Daily production target: 500–800 tonnes of ore
- Haul road gradient: 8–11%, turning radius: 15 m
- Safety berms: 5 m wide, 1 m high
- Bench face angles: 55–65°; hanging wall angles: 40–50°

Overburden Storage Area Features:

- square size with floor area 300*300 and top area 200*200, height 30 meters
- slope angle of this dump will be 31°

Total Area Coverage for All Infrastructures is about 85,338 square meters or 8.5338 Ha.

3.4 Key project Components

3.4.1 Designs

The proposed mining operation will employ an Open Pit Mining Method, specifically a single-pit design, to extract copper ore from the Kasisi East ore body. This method has been selected due to the shallow depth of the ore, high ore grade, and the geometry of the deposit which favors surface mining over underground approaches. Open pit mining is more cost-effective for shallow, tabular or massive ore bodies and provides better access, safer working conditions, and greater operational flexibility. The operations will be carried out using face shovels in the waste areas and excavators with the assistance of front-end loaders and dozers to mine the ore zones. The equipment to be used will have the mobility to allow it to move from face to face if required. Ore and waste will be hauled using the haulage trucks to the ore storage facility and waste rock dumpsite respectively.

3.4.2 Volume and Grade of Resource

Resource Characteristics (Kasisi East Ore Body):

- Ore zone area: 65,901 m²
- Average ore thickness: 3.43 m
- Average copper grade: 3.72% Cu

This will be mined over an estimated period of 5 years.

3.4.3 Production Rate

- Estimated ore volume: 565,101 tonnes
- Estimated contained copper metal: 21,000 tonnes
- Daily production target: 500–800 tonnes of ore

3.5 Infrastructure to be established

Infrastructure and facilities to be put up at the proposed Open pit Mine project for copper will comprise of the following:

- Single Pit (1)
- Overburden Storage area

3.6 Anticipated Wastes from the Project Cycle

The waste materials (hazardous and non-hazardous) to be generated at the proposed Open pit Mine project for copper, during the construction, operation and decommissioning and closure phases are classified as follows:

3.6.1 Site Clearing and Construction Phase

Types of Waste:

Hazardous Wastes

- Used Oil and Lubricants: From construction machinery and vehicles.
- Batteries: Used in construction equipment and vehicles.

Non-Hazardous Wastes

- Excavated Soil and Rock: Overburden and soil removed during site preparation.
- Domestic Waste: Generated by construction workers, including food waste, paper, and plastic.
- Scrap Metal: from construction activities such as installation of dewatering pumps and leftover materials.

3.6.2 Operation Phase

Types of Waste:

Hazardous Wastes

- Used Oil and Lubricants: From mining machinery, vehicles, and equipment.
- Contaminated Soil: From accidental spills of oil, fuel, or chemicals.
- Explosive Residues: From blasting operations.
- Batteries: From equipment and vehicles.

Non-Hazardous Wastes

- Waste Rock: Non-ore material excavated during mining.
- Topsoil: Removed and stored for future site rehabilitation.
- Domestic Waste: Generated by mine workers, including food waste, paper, and plastic.
- Scrap Metal: From machinery and equipment maintenance.
- Packaging Materials: From supplies and consumables.
- General Industrial Waste: Includes discarded parts and materials from maintenance activities.

3.6.3 Decommissioning and Closure Phase Waste

Types of Waste:

Hazardous Wastes

- Used Oil and Lubricants: From decommissioning machinery and vehicles.
- Batteries: From remaining equipment and vehicles.
- Contaminated Soil: From spills or leaks during the decommissioning process.

Non-Hazardous Wastes

- Waste Rock and Overburden: Remaining from the mining operations.
- Topsoil: Used for site rehabilitation and revegetation.
- Domestic Waste: Generated by workers during decommissioning.
- Scrap Metal: From dismantled machinery and equipments
- Packaging Materials: From supplies used during decommissioning.
- Vegetative Waste: From site restoration activities.

4.0 EIA SCOPE OF WORK

This Environmental Impact Assessment (EIA) will be conducted in accordance with the Environmental Management Act No. 12 of 2011 and the EIA Regulations, Statutory Instrument No. 28 of 1997. The scope of work will cover all phases of the project lifecycle including construction, operation, decommissioning, and closure.

4.1 Methodology of EIA Work

The EIA study will be undertaken through the following steps:

- **Desk Study / Literature Review**

- ✓ Review of relevant legislation, policies, and guidelines
- ✓ Analysis of previous EIA studies for similar projects
- ✓ Desktop analysis of topography, land use, hydrology, and sensitive ecosystems using satellite imagery and GIS

- **Baseline Environmental and Social Surveys**

The study team will collect primary data on:

- ✓ Air quality (TSP, PM10, PM2.5)
- ✓ Noise levels
- ✓ Surface and groundwater quality
- ✓ Soil properties
- ✓ Flora, fauna, and avifauna
- ✓ Land use patterns
- ✓ Social-economic and cultural aspects

- **Stakeholder Consultation**

- ✓ Continued engagement with Interested and Affected Parties (IAPs)
- ✓ Focus group discussions and structured interviews with community leaders and government agencies.

- ✓ Public disclosure of findings
- **Impact Identification and Assessment**
 - ✓ Use of checklists, matrices, and expert judgment to identify direct, indirect, cumulative, reversible, and irreversible impacts
 - ✓ Use of modeling tools (e.g. dispersion models, risk analysis) where appropriate
- **Mitigation Measures**
 - ✓ Identification of feasible, cost-effective, and site-specific mitigation and enhancement measures
 - ✓ Preparation of an Environmental and Social Management Plan (ESMP)
- **Development of Alternatives**
 - ✓ Assessment of site, design, technology, and "No Project" options
 - ✓ Comparative analysis of impacts for each alternative
- **Preparation of EIS**
 - ✓ Compilation of EIA findings into a comprehensive Environmental Impact Statement for submission to ZEMA
 - ✓ Integration of stakeholder feedback and ZEMA's comments
- **Environmental Monitoring and Follow-Up**
 - ✓ Design of a monitoring program to track the implementation of mitigation measures and **compliance with regulations**

The scope of work includes, but is not limited to the following activities:

- Holding of the scoping meeting for the proposed Open Pit Copper Mine Project. (done)
- Writing the scoping meeting report.
- Writing the terms of reference report.

- Submissions of the scoping meeting and ToRs reports to ZEMA for approval.
- Conducting environmental baseline studies and data collection,
- Defining a clear boundary of the project footprint and buffer zone
- Identifying areas of indirect impact (e.g. surrounding settlements, stream, road corridor)
- Writing the draft EIS document.
- Submitting the draft EIS document to ZEMA.
- Incorporating comments into the draft EIS;
- Conducting a disclosure meeting; and
- Incorporating comments and concerns from the disclosure meeting into the draft EIS and submitting the final EIS to ZEMA for consideration of the proposed Copper Concentrate Processing Plant.

The EIA will:

- Describe baseline environmental and socio-economic conditions
- Identify potential environmental and social impacts
- Propose mitigation and enhancement measures
- Develop an Environmental and Social Management Plan (ESMP)
- Conduct public consultations

The boundaries of the EIA study areas have been based on the following aspects:

- The proposed project footprint – including the topsoil and overburden storage areas.
- Similarly, the determination of the socio-economic or communities to be studied is based on previous knowledge of the project area and inputs from community engagements through public meetings, understanding of the project footprint and potential impacts on the communities.

Other adjacent or remote areas that should be considered with respect to the project study are the neighbouring processing plants that may compete for the same resources and the nearby communities and water bodies

5.0 EIA METHODOLOGY

The methodology to be used in collecting data and information for this study will involve field visits, measurements, literature review of relevant documentation - including several legislative instruments and public consultations with various key stakeholders and interest groups.

Samples of soil and water will be collected from surface water bodies within the mine license area (and outside, where possible) and taken for testing and analysis at a laboratory recognized by ZEMA. Noise levels and air quality monitoring for particulate matter will also be conducted on site during baseline data collection site visits.

In summary, the following approaches will be used (or have already been used) during data collection as part of the EIA studies for the proposed Open pit Mine project for copper:

5.1 Literature Review

All relevant Project documentation by the developer, concerning studies and reports, environmental biophysical and social economic data, District situational reports and planning reports and relevant legislation were reviewed. In summary, documentation and legislation reviewed included the following:

Policy Framework

- **National Policies:** Includes the National Environmental Policy, National Mining Policy, and National Water Policy.

Legal Framework

- **Key Legislation:**
 - ✓ Environmental Management Act (EMA) 2011, along with its Extended Producer Responsibility (EPR) Regulations.
 - ✓ Mines and Minerals Development Act 2022, including associated Environmental and Environmental Protection Fund Regulations.
 - ✓ Water Resource Management Act 2011.
- **Other Relevant Acts:** The Pneumoconiosis Act, Agricultural Lands Act, Public Health Act, Local Government Act, Urban and Regional Planning Act, Land Act, Land Acquisition Act, and National Heritage Conservation Commission Act.

Other Documents Reviewed

Past Environmental Impact Assessment (EIA) documents for Kasenga Copper Project

5.2 Scoping Meetings

The central policy of the EIA is to provide an opportunity for public participation in the project design and implementation, throughout the entire EIA process. In this respect, stakeholders who included individuals, groups of the local communities living adjacent to or within close proximity to the proposed Open pit copper mine who are likely to be affected directly or indirectly by the implementation of the proposed project were consulted. Public institutions like Mines Safety Department (MSD), Zambia Environmental Management Agency (ZEMA), Local Authorities, NGOs and interested parties were invited and in attendance during the scoping meeting. The signed list of the attendees of the scoping meeting has been attached as appendices of this report.

5.3 Targeted Key Stakeholders and Individuals

This included NGOs/community groups, Provincial and District Offices in charge of key sectors like water, education, social welfare, as well as interested and affected parties and neighboring companies. Issues of focus in the consultations involved people's views, concerns and expectations of the proposed project.

5.4 Initial Environmental Survey of the Proposed Project Site

The study team and Sino Xinyuan Mining Company Limited 's technical personnel conducted field visits, where members of the team investigated specific necessary issues of concern.

This involved on-site field inspections of the proposed project site and its surroundings to establish environmental and socio-economic baseline conditions on which the identification of impacts and their corresponding mitigation measures would be based.

In summary, this exercise included:

- Transect walks through the license project area; and
- Nearby community visits (Kasisi area)

5.5 Impacts Assessment Methodology

The methodology to be used in evaluating potential impacts associated with the proposed Open pit Mine project for copper is described below as follows:

5.5.1 Impact Assessment Steps

The steps to be followed during impacts identification, evaluation, rating and identification of mitigation measures are as indicated below:

- a) Characterization of the baseline environment: this will involve establishing existing conditions before project related activities are implemented and any associated effects generated;
- b) Identification of different sources of potential impacts and the actual impacts likely to be generated by these different aspects of the proposed project;
- c) Rating of potential impacts before implementing any mitigation measures (for negative impacts) or enhancement measures (for positive impacts);
- d) Proposing mitigation and enhancement measures to address or enhance identified impacts; and
- e) Rating the impacts after mitigation measures have been put in place, to produce a residual impact rating.

5.5.2 Impacts Rating Criteria

An impact rating is the product of two elements: (a) the severity of the potential impact and (b) the likelihood of the event occurring.

Table 33 The impact rating criteria to be used is summarised below as follows:

Impact Rating	Duration and Frequency	Extent
<i>Low</i>	Short-term (up to 1 year) Low Frequency	Potential to affect environmental conditions, species and habitats over a short period of time, is localised and reversible.
<i>Medium</i>	Medium-term (1 to 7 years) Medium or intermittent frequency	Potential to affect environmental conditions, species and habitats in the short to medium term. Ecosystems integrity will not be adversely affected in the long term, but the effect is likely to be significant in the short or medium term to some species or receptors. The affected area may be able to recover through natural regeneration and restoration.
<i>High</i>	Long-term (more than 7 years) and irreversible Constant/High Frequency	Potential to affect environmental conditions, species and habitats in the long term, may substantially alter the local and regional ecosystem and natural resources, and may affect sustainability. Regeneration to its former state would not occur without artificial intervention. Potential to affect environmental conditions over the long term, has local and regional effects and/or is irreversible.

5.5.3 Severity and Enhancement Criteria

The severity or enhancement of each identified potential impact will be rated using the criteria in tables 4, 5, 6 and 7 below. The colours used in the tables are for reviewing the potential impacts and their relative magnitudes. Hence, they are not definitive.

Table 34 Severity Rating Criteria (Negative Environmental Impacts)

Impact Rating	Duration and Frequency	Extent
<i>Low</i>	Short-term (up to 1 year) Low Frequency	Potential to affect environmental conditions, species and habitats over a short period of time, is localised and reversible.
<i>Medium</i>	Medium-term (1 to 7 years) Medium or intermittent frequency	Potential to affect environmental conditions, species and habitats in the short to medium term. Ecosystems integrity will not be adversely affected in the long term, but the effect is likely to be significant in the short or medium term to some species or receptors. The affected area may be able to recover through natural regeneration and restoration.
<i>High</i>	Long-term (more than 7 years) and irreversible Constant/High Frequency	Potential to affect environmental conditions, species and habitats in the long term, may substantially alter the local and regional ecosystem and natural resources, and may affect sustainability. Regeneration to its former state would not occur without artificial intervention. Potential to affect environmental conditions over the long term, has local and regional effects and/or is irreversible.

Table 35 Severity Criteria (Negative Social or Health Impacts)

Impact Rating	Duration	Extent	Ability to Adapt	Socio-Cultural Outcome	Safety/Health Outcome
<i>Low</i>	Short-term (up to 1 year) Low Frequency	Individual/ Household.	Those affected will be able to adapt to the changes with relative ease, and maintain pre-impact livelihoods, culture, quality of life and health.	Inconvenience but with no consequence on long-term livelihoods, culture, quality of life, resources, infrastructure and services.	Event resulting in annoyance, minor injury or illness that does not require hospitalization.
<i>Medium</i>	Medium-term (1 to 7 years) Medium or intermittent frequency.	Small number of households.	Those affected will be able to adapt to change, with some difficulty, and maintain pre-impact livelihoods, culture, quality of life and health but only with a degree of support.	Primary and secondary impacts on livelihoods, culture, quality of life, resources, infrastructure and services.	Event resulting in moderate injuries or illness, which may require hospitalization.
<i>High</i>	Long-term (more than 7 years) and irreversible. Constant frequency	Large part of/full settlement	Those affected will not be able to adapt to changes and continue to maintain pre-impact livelihood.	Widespread and diverse primary and secondary impacts likely to be impossible to reverse or compensate for.	Catastrophe event resulting in loss of life, severe injuries or chronic illness require hospitalization.

Table 36 Enhancement Criteria (Positive Environmental Impacts)

Impact Rating	Duration	Extent	Degree of Change	Focus/Sensitivity
<i>High Level of Enhancement</i>	Benefits will be sustained over the long term.	Benefits will extend beyond local environment (i.e linkage of fragmented habitat, e.g regional corridor).	Direct benefits to species or resources will provide significant opportunities for sustainability.	Benefits will pertain to species, habitats and natural resources that are degraded, or are sensitive, rare, or in need of protection.
<i>Medium Level of Enhancement</i>	Benefits will be measurable in the short term and possibly longer.	Benefits to many species, habitats and natural resources in the local environment and beyond.	Moderate benefits to species, habitat and natural resources that may provide some opportunities for sustainability.	Benefits will pertain to species, habitats and natural resources that have some level of degradation, sensitivity or rarity.
<i>Low Level of Enhancement</i>	Benefits will be short term.	Benefits to a few species, associated habitat and resources in the local environment only.	Minor benefits to species, habitat and natural resources that may provide minor opportunities for sustainability.	Benefits will pertain to species, habitats and natural resources that are not sensitive or rare.

Table 37 Enhancement Criteria (Positive Social and Health Impacts)

Impact Rating	Duration	Extent	Degree of Change	Focus/Sensitivity
<i>High Level of Enhancement</i>	Benefits will be lasting and sustained over the long term i.e more than 7 years.	Benefits throughout the local community and beyond to national level.	Direct benefits to individuals and communities will provide significant opportunities for leveraging secondary benefits and significantly improving livelihoods for themselves and others.	Benefits will pertain to vulnerable groups and those that would have otherwise have been affected as a result of the project.
<i>Medium Level of Enhancement</i>	Benefits will be felt for a medium period of time (1 to 7 years) or be intermittent over the long term.	Benefits to many individuals and households in the local community and beyond.	Moderate benefits to individuals and communities which will provide some opportunities for furthering themselves and improving livelihoods.	Benefits will possibly pertain to vulnerable groups and those that might have been losers from the project.
<i>Low Level of Enhancement</i>	Benefits will be short term (up to a year).	Benefits to a few individuals and households either in the local area and/ or beyond.	Some benefits to individuals and communities, potentially improving opportunities for furthering themselves and improving livelihoods.	Benefits will not pertain to vulnerable groups and will only benefit those that would have otherwise benefitted from the project.

5.5.4 Likelihood Criteria

The likelihood of an event occurring is categorized as follows:

- a) Low likelihood – Rare (few or no occurrences in project-related mining industry);
- b) Medium likelihood – Uncommon (documented occurrences in project-related mining industry); and
- c) High likelihood – Common (known to occur within the mining industry).

5.5.5 Determining the Ratings

The overall rating of impacts will be determined by using the matrix in table 8 below. It is worth noting that the matrices will only act as a guide and there may be times or instances where their rigid application would be inappropriate and where stakeholder perceptions and feedback would have a significant role to play. For specific impacts, where this would be the case, the ratings would be clearly explained in the evaluation of the impact.

Table 38 Impact Rating Matrix

Severity/Enhancement	Likelihood		
	Low	Medium	High
<i>High level of enhancement</i>	Moderate	Major	Major
<i>Medium level of enhancement</i>	Minor	Moderate	Major
<i>Low level of enhancement</i>	Insignificant	Minor	Moderate
<i>Low severity</i>	Insignificant	Minor	Moderate
<i>Medium severity</i>	Minor	Moderate	Major
<i>High severity</i>	Moderate	Major	Major

5.6 Environmental and Social Management Plan

The key output of an EIA is the Environmental and Social Management Plan (ESMP). The ESMP is an adaptive tool that should be designed to ensure that the mitigation measures proposed are effectively implemented during the life of the project and continually updated as need arises on the basis of actual field conditions and circumstances which may not have been anticipated at the time of the ESMP preparation. The ESMP to be prepared will include the Plant Closure and Rehabilitation plan.

As a management tool, at a minimum, the ESMP to be prepared and submitted to ZEMA will have the following components:

- An organizational structure which will ensure day to day oversight and implementation of the ESMP with the identification of senior management officials who would be responsible for the implementation of the ESMP;
- A clear statement of targets and a schedule of actions to be implemented, including the specific impact mitigation measures identified during the EIA process;
- Clear responsibilities for implementation of all mitigation measures, with a clear chain of reporting and oversight;
- A budget for implementation of the ESMP, including likely contingencies and a mechanism for budget sustainability in the event of unexpected events or circumstances;
- A contracting management system to ensure that all contractors and subcontractors are informed and aware of the EMP and a contracting mechanism which will provide incentives to contractors and their subcontractors to comply with the ESMP, or alternatively penalize them for failure to comply with the ESMP; and
- An ongoing monitoring and reporting schedule, with specified reporting intervals, for the life of the proposed Open pit copper mine - including independent audits to ascertain that the identified impacts are occurring as predicted and the mitigations measures in place are adequate. The ESMP will also include a mechanism to continually revise and implement necessary corrective actions aimed at ensuring that impacts are avoided, where possible, and if not are effectively mitigated.

6.0 EIA SCHEDULE

Table below presents a summary of the scheduled activities from ToRs approval by ZEMA to submission of final EIS copies by the developer to ZEMA:

Table 39 Schedule of EIA study Activities for the Proposed Open pit mine for copper by Sino Xinyuan Mining Company Limited

	Month															
	July, 2025				August, 2025				September, 2025				October, 2025			
No. of Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Scoping and ToRs Preparation	■	■	■													
ToRs approval				■	■											
Baseline studies					■	■										
EIS writing							■	■								
Draft EIS submitted to ZEMA								■								
Disclosure of draft EIS to the public								■								
Incorporate comments from ZEMA and Disclosure meeting into EIS									■	■						
Submission of Final EIS to ZEMA											■					

7.0 EIS REPORTING AND OUTPUTS

7.1 GENERIC ENVIRONMENTAL IMPACT STATEMENT FORMAT EXECUTIVE SUMMARY

- Briefly describe the project background, objectives, location, shareholders, investment cost, project description, technology, project alternatives, potential impacts, mitigation/enhancement measures and lifespan.
- The executive summary should be signed by the developer and the study team.

NON-TECHNICAL SUMMARY (In English and a local language commonly understood in the project area).

A summary (not detailed) description of the proposed project in a layman's language including:

- the project
- location
- investment cost
- major potential impacts
- Positive: e.g. Employment opportunities, boosting of local economy,
- infrastructure development,
- Negative: e.g. damage to land, plants and animals; pollution of water & air;
- displacement of people;
- mitigation for negative impacts and enhancement measures for positive impacts

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2.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Policy, legal and institutional framework relevant to the project

- Policy, legal and institutional framework relevant to the project
- Specific sections of the cited policy, legal and institutional framework relevant to the proposed project.
- Relevance of cited sections to the proposed development
- Compliance (how the development complies/will comply to the cited sections)

2.2 International agreements and Conventions

- International agreements and conventions relevant to the proposed project.
- Specific sections of the agreements and conventions relevant to the proposed project.
- Relevance of cited sections of the agreement or convention to the proposed development
- Compliance (how the development complies/will comply to the cited sections)

3.0 PROJECT DESCRIPTION

3.1 Location

- Provide the spatial extent of the proposed project site (Province,
- City/Municipality/district, specific site)
- Provide landmarks and their distances from the proposed site to help identify
- proposed project site

- Identify surrounding developments
- Provide coordinates of the proposed site where applicable

3.2 Nature of the Project

- Raw materials (including hazardous materials and their storage on site)
- Process and technology (including flow diagrams)
- Products and by-products
- Production capacity
- Schedule and lifetime of the project

3.3 Main activities

- Site preparation phase
- Construction phase
- Operation phase

4.0 Project Alternatives

4.1 Identification of alternatives such as but not limited to:

- i. Product/service
- ii. Site
- iii. Design
- iv. Technology
- v. Process
- vi. Raw materials

4.2 Analysis of each of the identified alternatives

4.3 List of chosen alternatives in order of preference

4.4 Reasons for choosing the preferred alternatives and rejecting the other alternatives

5.0 Environmental Baseline Study

- Description of the site and the surrounding environment especially those aspects that are relevant to the project including evaluation of the sensitiveness of the environment.

Baseline data should include but not limited to the following:

5.1 Climate

- Rainfall, Temperature, Humidity, Sunshine, etc.

5.2 Air quality

5.3 Geology

5.4 Hydrology

- Surface water quality
- Groundwater quality

5.5 Hydrogeology

5.6 Topography

5.7 Soils

5.8 Land use and land tenure

5.9 Built Environment

5.10 Noise and vibration

5.11 Fauna

- Terrestrial species (Include common names and respective scientific names)
- Aquatic species (Include common names and respective scientific names)
- Identification of rare or endangered species (Include common names and respective scientific names)

5.12 Flora

- Terrestrial species (Include common names and respective scientific names)
- Aquatic species (Include common names and respective scientific names)

- Identification of rare or endangered species (Include common names and respective scientific names)

5.13 Birds

- Field survey of bird species (Include common names and respective scientific names)
- Identification of rare and endangered bird species

5.14 Archaeological and cultural environment

- Identify and discuss cultural practices
- Identify and provide location for significant historical or archaeological features

5.15 Social-economic set up

- Population
- Growth rate, population density and distribution
- Administration
- Social services and amenities
- Market availability on various commodities
- Literacy levels, health and gender equity
- Traditional and religious practices and rites
- Assess vulnerability and/or need for resettlement and compensation

6.0 Impacts

6.1 Biophysical Environment

- Positive – direct, indirect, short term, long term, reversible and irreversible, local, regional
- Negative – direct, indirect short term, long term, reversible and irreversible, local regional

6.2 Socio-economic and cultural

- Positive – direct, indirect, short term, long term, reversible and irreversible, local, regional

- Negative – direct, indirect short term, long term, reversible and irreversible, local, regional

6.3 Evaluation of impacts significance should combine:

- the frequency of occurrence of the impact
- the duration of the impact
- the severity of impact
- the spatial extent of the impact
- the sensitivity of the element being impacted.

7.0 Environment and Social Management Plan

(Management Commitments for mitigating negative Environmental Impacts identified and evaluated in Section 6.0 and measures for enhancing positive impacts)

Environment and Social Monitoring Plan (These should include environmental management cost estimates, responsible personnel and the frequency of monitoring).

Table 40 Environmental and Social Management Plan Format

Aspect*	Impact	Mitigation/ Enhancement measure	Frequency of Monitoring	Time frame	Performance indicator	Responsible person	Cost
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*NOTE: Aspect is an activity, service or product that is likely to cause an impact due to interaction with the environment.

8.0 Decommissioning and Rehabilitation Plan

State environmental management commitments and associated costs

9.0 References

Full references of the main documents cited in the report should be given

10.0 Declaration of authenticity of report contents

11.0 Appendices

- Letter of approval of ToRs;
- Approved ToRs with respective attachments (including the scoping report, minutes of the consultative meeting/s and signed list of meeting attendees);
- Maps and satellite images;
- Figures (tables, charts, graphs, models, photographs);
- Proof of Public consultation (Minutes and comments from the public during disclosure and adverts);
- Specialized study Reports (e.g. water, soil, air, flora, fauna, archaeology, geotechnical)
- Raw data for the studies of baseline information gathered (water, soil, air, flora, fauna)
- Any relevant legal documents (title deeds or lease agreements, certificates of
- Incorporation, agreements, asset valuation reports, approval documents, Investment License etc.);
- Bibliography
- Any other relevant supporting documents or information that cannot be presented in the main report.

8.0 SPECIALIST STUDIES

During site visits aimed at data collection for the proposed project, the specialist studies will also consider the following impacts and issues, among others, for inclusion, as appropriate, in the proposed project EIS document for submission to ZEMA.

8.1 Ecological considerations

(a) Biological diversity

- Effect of the proposed Open pit Mine project for copper on number, diversity, breeding sites, etc. of flora and fauna within the project area.
- Breeding populations of fish and game; and
- Effects on the gene pools of domesticated and wild sustainable yield.

(b) Sustainable use including

- Effects on soil fertility;
- Nutrient cycles;
- Aquifer recharge, water run-off rates, etc.;
- Aerial extent of habitats; and
- Bio-geographical processes.

8.2 Social, economic and cultural considerations

Social, economic and cultural considerations include:

- Effects on generation or reduction of employment in the area;
- Social cohesion or disruption (resettlement);
- Immigration (including induced development when people are attracted to a
- development site because of possible enhanced economic opportunities);
- Communication - roads opened up, closed, re-routed; and
- Local economic impacts.

8.3 Landscape

- Views opened up or closed.
- Visual impacts (features, removal of vegetation, etc.).
- Compatibility with surrounding areas.
- Amenity opened up or closed e.g. recreation facilities.

8.4 Land Use

- Effects on land uses and land potential in the project area and in the surroundings areas.
- Possibility of multiple use

8.5 Water (Ground and surface water)

- Effects of surface water quality and quantity.
- Effects on underground water quality and quantity.
- Effects on the flow regime the water course.

8.6 Air Quality

- Effects on the quality of the ambient air of the area.
- Type and amount of possible emissions (pollutants).

8.7 Noise Levels

- Noise levels in the area at different times of the day.
- Identifying sources of noise in the area.
- Impacts of noise in the area

9 PROPOSED EIA TEAM

Team Member	Qualification	Expertise	Years of Experience	Role
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.	5	Lead Mining and Environmental Specialist
Eng Rex Chaaba	Beng. Mining Engineering	Planning of ESIA activities. Coordinating ESIA activities Compiling ESIA Reports Overseeing Public Consultations	3	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.	3	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	4	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.	4	Ecology

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.	5	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	3	Socio-economic Scientist to undertake socio-economic community-based research.

10.0 DECLARATION OF AUTHENTICITY OF REPORT CONTENTS

The scoping report and Terms of Reference are hereby submitted for your consideration, and to the best knowledge of the developer are a true reflection of the scoping exercise conducted and its results:

Signed:

Date:

Name:

Title:

11.0 OTHER RELEVANT INFORMATION /APPENDICES

11.11 APPENDIX 1: CERTIFICATE OF INCORPORATION

CF45
(Regulation 46)
Companies Registration No. **120210015880**
Serial No. **1172587**



REGISTERED



Republic Of Zambia

The Companies Act, 2017

(Act No. 10 of 2017)

The Companies (Prescribed Forms) Regulations, 2018

(Section 14)

CERTIFICATE OF INCORPORATION COMPANY LIMITED BY SHARES

This is to certify that SINO XINYUAN MINING COMPANY LIMITED is on and from the
10th day of May 2021 incorporated as a COMPANY LIMITED BY SHARES.

Given under my hand and seal at Lusaka, Zambia, this **10th day of May 2021**.



P.C. Mwaba
Assistant Registrar of Companies

For further details relating to this business visit
<http://www.pacra.org.zm>

11.12 APPENDIX 2: LARGE SCALE MINING LICENSE

Changwe



REPUBLIC OF ZAMBIA

The Mines and Minerals Development Act, 2015
(Act No. 11 of 2015)
The Mines and Minerals Development (General) Regulations, 2016

LICENCE NO. 26238-HQ-LML

LARGE-SCALE MINING LICENCE
(Section 32 of the Mines and Minerals Development Act, No.11 of 2015)

Holder's name: SINO XINYUAN MINING COMPANY LIMITED
Address:

The mining area shall be the area described in the Schedule and annexed hereto and bordered Red on the plan.

The licence relates to the following minerals: Copper, Cobalt, Gold and Nickel

The licence is granted for a period of 25 years commencing on the 30th day of March, 2020

The conditions of grant of the licence are as shown in the Annexures attached hereto.

issued at Lusaka on the 17th day of October, 2020


.....
Samuel C. Maango
Director

ENDORSEMENT OF REGISTRATION
This Large Scale Mining Licence has on this 30th day of March, 2020 been registered in the Register.


.....
Samuel C. Maango
Director

11.13 APPENDIX 3: MINUTES OF THE SCOPING MEETING
MINUTES OF THE SCOPING MEETING FOR THE PROPOSED OPEN PIT MINING OPERATIONS PROJECT BY SINO XINYUAN MINING LTD

Date: 29/07/2025

Time: 10:23 hrs (Start Time)

Venue: Kumena Basic School

Presenter: Eng. Kelvin C. Mwansa (Environmental Consultant)

Attendees:

- **Sino Xinyuan Mining Company Limited Representatives**
- **Environmental Consultant:** Eng. Kelvin C. Mwansa
- **Ward Development Committee (WDC) Chairman:** Mr. Humphrey Natala
- **Ward Chairman:** Mr. Enerst Mulife
- **Resettlement Chairperson:** Mr. Andrew Chulu
- **Zone Chairperson, Headman (Royal Establishment):** Mr. Mutame
- **Headmen:** Chiwaya, Mutamino, Kacha, Macha, Mboloma, Chipanama, Musopelo
- **Headwomen:** Chasha, Mwambula, Kabulongo
- **Local Community Members**

1. Opening Prayer (10:36 Hrs) The meeting commenced with an opening prayer led by Mr. Humphrey Natala, WDC Chairman.

2. National Anthem The National Anthem was sung by all attendees.

3. Opening Remarks from WDC Chairman Mr. Humphrey Natala, the WDC Chairman, extended a warm welcome to all attendees, including representatives from the Royal Establishment and all Headmen and Headwomen. He emphasized the critical importance of the meeting for all stakeholders.

4. Induna Introductions The following Headmen and Headwomen were introduced:

- **Headmen:** Chiwaya, Mutamino, Kacha, Macha, Mboloma, Chipanama, and Musopelo.
- **Headwomen:** Chasha, Mwambula, and Kabulongo.

5. Presentation by Eng. Kelvin Mwansa (Environmental Consultant) Eng. Kelvin C. Mwansa delivered a comprehensive presentation on the Proposed Open Pit Mining Operations Project by Sino Xinyuan Mining Ltd. Key points of the presentation included:

- **Introduction:** Sino Xinyuan Mining Company Limited, a Zambian-registered company, currently engaged in underground copper mining in Kasisi area, Chongwe District (Mining License No. 26238-HQ-LML), proposes to expand operations by

transitioning to open pit mining to enhance copper recovery and production under the same license. The new development targets the Kasisi East ore body.

- **Legal Framework:** The project is undertaking an Environmental, Social & Economical Impact Assessment (ESIA) in conformity with the Environmental Management Act. No 12 of 2011 and Statutory Instrument No. 28 of 1997. The ESIA aims to determine potential positive and negative impacts and propose mitigation measures.
- **Project Location:** The proposed mine is in Kasisi area, Chongwe District, Lusaka Province, approximately 40 km east of Lusaka CBD and 20 km from KKIA. It is a semi-rural area with mixed land use, accessed via the Great East Road and Kasisi Road. The Chongwe River is 2.09 km south of the site.
- **Open Pit Mine Operations:** Sino Xinyuan intends to develop a single open pit mine involving ore preparation & blasting, excavation & haulage, waste rock handling, water management (pit dewatering, stormwater control), and safety features (berms, proper pit slopes).
- **Open Pit Design Parameters:** Pit Depth: 45 meters; Surface Area: 256m x 218m; Floor Area: 218m x 128m; Daily Ore Output: 500-800 tonnes; Bench Angle: 55-65°; Haul Road Gradient: 8-11%; Safety Berms: 5m wide, 1m high.
- **Project Capacity and Output:** The Kasisi East ore body contains an estimated 565,101 tonnes of ore, with an average copper grade of 3.72% Cu, totaling approximately 21,000 tonnes of contained copper.
- **Positive Environmental Impacts:** Increased copper production, foreign exchange earnings, direct and indirect job opportunities, increased council levies and rates for Chongwe District Council, general improvement of local well-being through Corporate Social Responsibility (CSR), and increased government revenue through taxes.
- **Negative Impacts and Mitigation Measures:**
 - **Dust Generation and Air Quality Degradation:** Mitigation includes regular watering of haul roads, windbreaks, dust suppression systems, speed limits, and routine air quality monitoring.
 - **Noise and Vibration from Operations:** Mitigation includes controlled blasting with notice, limiting blasting to daytime, use of silencers, acoustic barriers, and worker ear protection.
 - **Water Resource Contamination:** Mitigation includes lined settlement ponds, geo-membrane liners for storage, regular inspection of dewatering systems, secondary containment for hazardous substances, and water quality monitoring.
 - **Soil Erosion and Degradation:** Mitigation includes stripping and storing topsoil, stormwater diversion channels, phased clearing, and erosion control mats/silt fences.

- **Project Investment:** Estimated capital investment of \$9 million.
- **Key Milestones:** Scoping Meeting (Ongoing), Baseline Studies (Post-scoping), ESIA Preparation (Post-baseline studies), Permitting and Approvals (Construction to commence after ZEMA approval).
- **Conclusion:** Sino Xinyuan Mining Company Limited is committed to transparent engagement and sustainable mining practices and invited all stakeholders to participate in shaping a project that benefits both the local community and the nation.

6. Questions or Concerns

Following the presentation, the floor was opened for questions and concerns from the stakeholders.

- **Mr. Enerst Mulife (Ward Chairman):**
 - Expressed concern that mine operations appear to primarily benefit the company, with insufficient regard for the community.
 - Noted the company's expansion from one underground operation to a third proposed surface mining project, yet visible community support remains lacking despite evident profits from expansion.
 - Stated that the community had to resort to force for certain projects, such as road grading, to be undertaken.
 - Reminded the company of an unfulfilled promise to build a hospital or improve the existing clinic.
 - **Response from Mine Management:** The Mine Management stated that the community and company had agreed that the community should suggest a site for the hospital, but no solid suggestion has been submitted to the Mine Management.
- **Mrs. Kabulongo (Headwoman):**
 - Acknowledged the potential impacts of mining operations and voiced concerns regarding environmental and health issues for nearby villages.
 - Expressed skepticism, suggesting the company might only be alluring the community now, but would not provide support once their objectives are achieved, as there is currently nothing tangible to show for their support.
- **Mr. Andrew Chulu (Chairman WDC):**
 - As a resettlement chairperson, he raised concerns that the Mine Management does not prioritize Zambians or the local community.
 - Recalled a stakeholder meeting where the Mine Management proposed building 30 houses for local workers, which was recorded in the minutes, but nothing has been done.

- Highlighted the lack of upgrades for schools, including Kasenga and Kumena Basic School.
 - Stated that the company has not presented any community budget to them.
 - Reiterated that the promised clinic has not been built for the community, and the existing clinic within the mining area is difficult for the community to access.
- **Mr. Mutame (Zone Chairperson, Headman from Royal Establishment):**
 - Expressed disappointment that the land for the clinic has not yet been chosen and presented to the Mine Management.
 - Noted that local employment has not been adequately recognized.
 - Stated that the majority of people in the resettlement area have not felt the impact of being left out of CSR objectives.
 - Emphasized the need to address water pollution and other environmental concerns, especially given the proximity of villages to the project site.
 - Insisted that the Mine Management should first address pending CSR objectives before embarking on the new expansion project.
 - Stressed the importance of local mine workers supporting the community.
 - Proposed that an independent meeting be held among the local villages, with minutes recorded, to discuss the project.
 - Highlighted a lack of unity among village groups and resettlement area groups when articulating community needs, and the absence of a proper communication channel to convey CSR needs to the Mine Management.
 - Attributed the slow implementation of CSR objectives to changes in Mine Management, as each new management seems to start objectives from scratch.
 - Suggested there might be misrepresentation of funds or actual costs of CSR project implementations, making it appear as though the company is doing more for the community than it is.

7. Closing Prayer (13:07 hrs) The meeting concluded with a closing prayer.

8. Closing Remarks Mr. Humphrey Natala, WDC Chairman, delivered the closing remarks, thanking everyone for their participation.

Prepared By: Chibwe Musonda

Date: 04/07/2025

Signature: 

11.14 APPENDIX 4: SIGNED LIST OF ATTENDEES

SCOPING MEETING ATTENDANCE LIST FOR THE PROPOSED OPEN PIT MINING OPERATIONS BY SINO XINYUAN MINING LTD.

No.	Name	Organization	Phone No.	Signature
01	KADUNGAN KAMBAI	CHIWAYA	0977420112	[Signature]
02	NEVER HANWAY	LIMA	0978453766	N. Hanway
03	MILDRED SIAMIZI	Z. LIMA	0971168235	MSA
04	KINGSTON WACHIKI	CHIWAYA	0770046535	[Signature]
05	JOHN KAHAMA	KWACHA	09762264	[Signature]
06	ROBERT DAK	LIMA	09774821157	[Signature]
07	JOHN M. PHISI	KWACHA	097792668	[Signature]
08	MULINDA KAZIMBA	LIMA	09741160198	MKB
09	MELVIN MPULA	LIMA	0975639778	[Signature]
20	SOLOMONI	LIMA	0977891767	[Signature]
21	GABRIEL CHIKOKA	LIMA	097067799	G. Chikoka
22	ZANTWE NGOMA	LIMA	0772642266	[Signature]
23	PAUL C. KAZIYA	LIMA	0977433161	[Signature]
24	ALICE MUKATI	LIMA	0974186784	Alice
25	OBBY MOYO	LIMIT	0972302577	[Signature]
26	COMRADE MULIMBA	PTC CHAMBA KAMBIA	097765115	[Signature]
27	CHRISTOPHER SANDARA	KASONGA	0979431048	CS
28	VICTOR NG'ANDU	KASONGA B	0977502117	[Signature]
29	KAZIYA EMELEDA	KUMONGA P	0979446030	[Signature]
30	LIVANDO PRADO	KUMONGA P	0972711156	[Signature]
31	SOKOLA ROXINA	KUMONGA P	0967715556	[Signature]
32	MWALE BRIAN	LIMA	0976088920	[Signature]
33	DOYER MUKAMU	SINO XINYUAN	0974451104	[Signature]
34	TEDDY C. MALITI	KASONGA	0973208911	[Signature]
35	BONFACE MUNDAMO	SINO XINYUAN	0969223937	[Signature]
36	MUSAMPALA JOSEPH	SINO XINYUAN	097157512	[Signature]
37	LOUIS MUKATI	CHIWAYA	097222960	[Signature]
38	MADALYN PRAY	SINO XINYUAN	0962293691	[Signature]
39	ZHONG KICHUN	SINO XINYUAN	077474763	[Signature]
40	PONG JABIR	SINO XINYUAN	0769183178	[Signature]

11.15 APPENDIX 5: PICTURES OF STAKEHOLDERS DURING THE MEETING





11.16 APPENDIX 6: MEDIA ADVERT FOR THE SCOPING MEETINGS

YOBRE CHULUZIDA

A LUSAKA businessman is expected in court to exonerate himself of allegations that he swindled Zambia Police Service spokesperson Rae Hamoonga out of over K100,000.

The suspect, Cryford Chuuba, is alleged to have obtained K159,550 from Mr Hamoonga by falsely pretending that he had over 70 cows for sale, when in fact not.

Chuuba, 36, of Kasulu village, is charged with obtaining money by false pretences, allegations he denied before Lusaka magistrate Amy Masoja-Chingwa.

Trial is scheduled to start at the monthend.

Obtaining money by false pretence is a criminal offence punishable by imprisonment of up to three years.

Meanwhile, police in Lusaka are investigating a suspected murder case involving Danny Sinyangwe, who is aged between 40 and 50.

Mr Sinyangwe is believed to have been living alone at the time he met his fate.

Police assistant officer Chipo Kaitisha said in a statement that according to neighbours, the deceased was last seen in the company of an unidentified male on Saturday.

Ms Kaitisha said the neighbours added that Mr Sinyangwe appeared to be in good health the last time they saw him.

She explained that on the day he was seen with the unknown person, the deceased left his phone at his neighbour's house to charge at around 19:00 hours before heading out to watch the Zambia women's football match.

She said later that day, he

collected his phone and went back to his house.

Ms Kaitisha said the following day around 12:00 hours, a concerned member of the public reported the discovery Mr Sinyangwe's body in his house to Chawama Police Station.

"When officers arrived at the scene, they found the deceased lying face up in a pool of blood, shirtless.

"A knife and an iron bar were found next to the body. The body discovered was also believed to have sustained a deep cut to the chest and another wound at the back of the head," Ms Kaitisha said.

She disclosed that the body has since been deposited in the University Teaching Hospital mortuary for post-mortem examination.

PUBLIC NOTICE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) SCOPING MEETING


Climax Environmental and Technical Services Ltd wishes to inform the general public that it will be conducting a Scoping Meeting as part of the Environmental Impact Assessment (EIA) process for the proposed open pit mining operations by Sino Xinyuan Mining Ltd, under Mining License No. 26238-HQ-LML.

All interested and affected parties are invited to attend.

Meeting Details:

 Venue: Kumena Basic School

 Date: 29th July 2025

 Time: 09:00 hours

This meeting is an opportunity for stakeholders to learn about the proposed project, raise any concerns, and contribute to the EIA process.

For more information, please contact:

 Engineer Mwansa

 0966122943

 climaxenvironmental@gmail.com

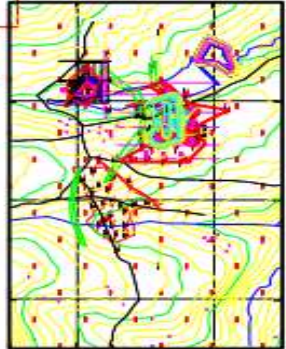
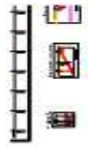
RSO388503/15.07

BLUEPRINT ENVIRONMENTAL & CONSTRUCTION LIMITED AND STARLINK TECHNOLOGY LIMITED

BLUEPRINT

INVITATION TO AN ENVIRONMENTAL AND SOCIAL IMPACT CONSULTATION SCOPING MEETING FOR THE PROPOSED DEVELOPMENT OF A COPPER PROCESSING PLANT IN KIPUSHI AREA OF MUSHINDAMO DISTRICT

Blueprint Environmental and Construction Limited on behalf of Starlink Technology Limited invites you to a public scoping meeting for the proposed development of a Copper Processing Plant in Kipushi Area of Mushindamo District. In compliance with section 29(1) of the Environmental Management Act 12, 2011, the company is required to prepare and submit an environmental Social Impact Assessment Report to Zambia Environmental Management Agency (ZEMA). This invitation is part of the Environmental and social Impact Assessment process, requiring Starlink Technology Limited to hold a public scoping meeting for the purpose of introducing the project to the community and gathering views for consideration in the preparation of an Environmental and Social Impact Assessment. The company, therefore, invites the general public, interested and Affected Parties (IAPs), NGOs, Community Based Organizations (CBOs) to facilitate for the preparation of the Environmental and Social Impact Assessment. The venue, date and time for the meeting are as indicated below:



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11.8 APPENDIX 8: 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

St Clement Secondary School

2008-2012:

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 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

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

C.C.T.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

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 

CHIBWE MUSONDA - CV

NATHAN KAELA

Address: Ndeke Village, Kitwe, Zambia.

Phone #: +260 962 121614

Email: nathankaela@gmail.com

Nationality: Zambian

NRC #: 45638261/1

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 TERRITORY 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.

ACHIEVEMENTS

- 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 out 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

-
- 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 pertaining 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

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: 

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 temperatures of 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 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: 

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: moesmwamba57@gmail.com | Phone: +260 977 469 595

Sign: 

11.9 APPENDIX 9: CONSENT LETTER FROM THE SENIOR CHIEFTAINESS



Busoli Royal Establishment

Senior Chieftainess Nkomeshya, Makoya Royal Palace
P.O. Box 36, Chongwe, Tel:.....
Fax:.....

22nd July, 2025,

The General Manager

Sino Xinyuan Mining Company Limited

LUSAKA CHONGWE.

RE: AUTHORIZATION TO OPEN THE SECOND OPEN PIT MINE AT THE EXISTING PREMISES

The Busoli Royal Establishment hereby grants Sino Xinyuan Mining Company Limited the authorization to commence operations for the second open pit mine within the same premises where your current mining activities are being undertaken.

This authorization is granted on condition that Sino Xinyuan Mining Company Limited fully complies with the terms of the Community Social Responsibility (CSR) Agreement already signed between your company and the Community of the Busoli Chiefdom.

Specifically, the company is required to:

1. Adhere to all CSR commitments, including:

- Annual maintenance of the access road
- Construction of additional clinic wards in the current year
- Donation of a minibus for traditional affairs in 2026
- Construction of the Village Headman's residence in 2026

2. Ensure peaceful and cooperative engagement with the local community throughout your expanded operations.
3. Provide regular updates to the Busoli Royal Establishment regarding the progress of the CSR obligations.

This letter serves as official authorization for Sino Xinyuan Mining Company Limited to open the second open pit mine, with the understanding that these conditions will be fully respected and implemented.

We look forward to a continued partnership that benefits both the community and the company.

Your Sincerely,

BUSOLI ROYAL ESTABLISHMENT

(Signature)
DR SENIOR CHIEFTAINESS NKOMESHYA MUKAMAMBO II

Cc. Headman Mutamiro


Zone Chairperson - 22/11/2025

ZONE 8 CHONGWE
 MUKAMAMBO II PALACE
 P.O. BOX 36,

Cc. Headman Kanchubwi

Kanchubwi Village
ZONE 8 CHONGWE

11.10 APPENDIX 10: ZEMA DECISION LETTER FOR EXPLORATION OF THE PROJECT AREA.



ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

Head Office
 Corner of Church & Suez Roads
 P.O Box 35131
 Lusaka, Zambia
 Tel: +260-211-254023/254059

All Correspondence to be addressed to
 The Director General

info@zema.org.zm www.zema.org.zm

In reply please quote
ZEMA/IRN/101/4/1
No.

October 15, 2019.

The Director
 Mwembeshi Resources Limited
 Plot No 5777N Great East Road, Kalundu
 P.O Box 50395
LUSAKA.

Dear Sir/Madam,

RE: REPLACEMENT AND TRANSFER OF DECISION LETTER IN RESPECT OF THE ENVIRONMENTAL PROJECT BRIEF FOR PROPOSED MINERAL EXPLORATION IN CHONGWE, SOLI WANYINIKI FOREST RESERVE, LUANO LALA FOREST RESERVE AND LOWER ZAMBEZI NATIONAL PARK BY MWEMBESHI RESOURCES LIMITED.

Reference is made to the above captioned matter.

We wish to advise that the Zambia Environmental Management Agency ("ZEMA") has reviewed your application to replace Decision Letter referenced ECZ/EPB/92/04 dated **March 16, 2005** issued to **Mwembeshi Resources Limited** in respect of the Environmental Project Brief for Mineral Exploration in Chongwe, Soli Wanyinika Forest Reserve, Luano Lala Forest Reserve and Lower Zambezi National park ("**the Project**") by Mwembeshi Resources Limited.

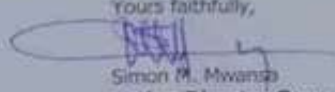
We have also considered your application to transfer the Decision Letter aforesaid from Mwembeshi Resources Limited ("**the Transferor**") to Sinomine Resource Geological Engineering Limited ("**the Transferee**").

This minute serves to inform you that your respective applications are hereby **approved**.

By copy of this letter, the Transferee herein shall be required to comply in full with all the conditions of the Decision Letter aforesaid. Further, the said Transferee is advised to fully acquaint themselves with the commitments contained in the approved Environmental Impact Assessment report in respect of the Project.

Find herewith attached the **Replaced Decision Letter** with an endorsement of transfer to the Transferee.

Yours faithfully,



Simon M. Mwanza
Acting Director General
ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

Off. Council Secretary – Lilongwe Town Council, LUANGWA
 Council Secretary – Chingwe Town Council, CHONGWE
 Director Mine Safety Department, KITWE
 Director General – Zambia Wildlife Authority, CHILANGA
 Director – Forestry Department, Lotse House, LUSAKA
 Director – Legal Services, Zambia Environmental Management Agency, LUSAKA

Southern Regional Office
 P.O Box 71162
 Tel: +260-212-621946/61947

Solwezi
 P.O Box 110124
 Tel/Fax: +260-213-821297

Lusitania
 P.O Box 40105
 Tel/Fax: +260-213-211279

Chisoka
 P.O Box 710027
 Tel: +260-216-221234

Chimwezi
 P.O Box 120111, Chimwezi
 Tel/Fax: +260-211-717261

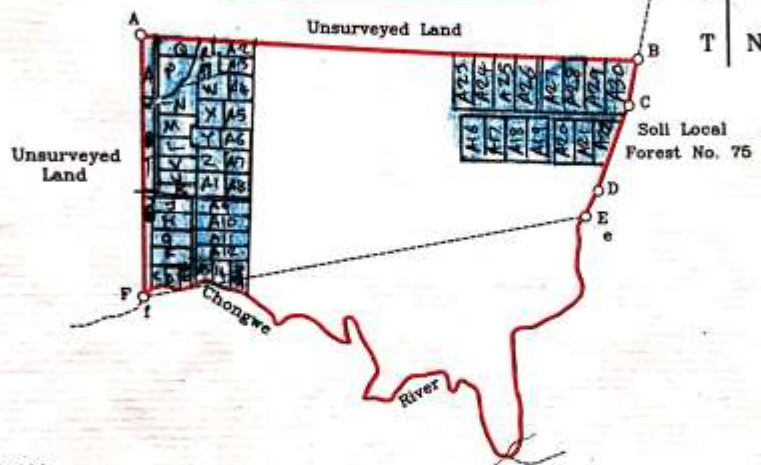
SIDES METRES	ANGLES OF DIRECTION	SYSTEM Y	CO-ORDINATES UTM 27 METRES		DIAGRAM NUMBER SD_34032/2020
			X		
AB 4778.91	272.20.07	A	864305.24	8318080.95	APPROVED: GOVERNMENT SURVEYOR DATE: 20/10/2020
BC 449.03	12.18.52	B	869080.18	8317868.23	
CD 871.42	21.12.59	C	868984.66	8317427.47	
DE 277.18	28.21.18	D	868689.30	8318815.12	
EF 4339.62	80.45.22	E	868497.31	8318397.78	
FA 2362.06	182.12.46	F	864214.04	8315700.66	
GA 44.48	Connecting Data	G	864260.80	8318052.96	
FG 2362.76	92.32.20				
	01.08.02				

River Data
Ee 20.00 218.21.18
Ff 60.00 182.12.46

Areas
Rect Area 887.9100 Ha
Curv Area +335.8333 Ha
Total Area 1203.7433 Ha

DIAGRAM No. SD_34032/2020 SUPERSEDES
DIAGRAM No. 392/1995

GOVERNMENT SURVEYOR
DATE: 20/10/2020



SCALE 1: 50000

BEACON DESCRIPTION All are iron pegs in concrete, Except B: Theoreticals
A-B-C-D-E-e-Right bank of Unnamed Stream to the Confluence of
THE FIGURE Chongwe River and Unnamed Stream-Right Bank of Chongwe River-f-F-A
REPRESENTS 1203.7433 Hectares
OF LAND BEING Lot 2677/M
SITUATED IN THE Lusaka PROVINCE REPUBLIC OF ZAMBIA
SURVEYED IN December, 1994

BY K.W. Liywalli
LAND SURVEYOR

PARENT DIAGRAM No.:
SURVEY RECORDS No.: D107/1994
S G FILE No.: SD/104/37/13
PLAN No.: D107/1994
MAP REFERENCE: Sheet 152B A4

APPROVED IN TERMS OF
SECTION 33 OF
THE LAND SURVEY ACT.

DATED THE 25th DAY OF May 2025

BETWEEN

SINOMINE RESOURCE
GEOLOGICAL ENGINEERING
COMPANY LIMITED

TO

SINO XINYUAN MINING COMPANY LIMITED

DEED OF ASSIGNMENT

Relating to The Remaining Extent of Lot No. 2677/M situate in the
Lusaka Province of Zambia

2 79

IN WITNESS whereof the parties hereto have caused their Common
Seals to be hereunto affixed the day and year first before
written.

THE SCHEDULE hereinbefore referred to:-

ALL THAT piece of land in extent 845.8432 more or less being The
Remaining Extent of Lot No. 2677/M situate in the Lusaka Province
of Zambia which piece of land is more particularly delineated
and described on Diagram No. SD_34032 of 2020 TOGETHER with all
unexhausted improvements thereon EXCEPT and RESERVED all
minerals oils and precious stones whatsoever upon or under the
said land.

THE COMMON SEAL of SINOMINE RESOURCE GEOLOGICAL ENGINEERING
COMPANY LIMITED)

Was hereunto affixed)

in the presence of)

DIRECTOR: 柳卫

SECRETARY: 张明

THE COMMON SEAL of SINO XINYUAN MINING COMPANY LIMITED)

Was hereunto affixed)

in the presence of the)

DIRECTOR: 刘海华

SECRETARY: 曹学波

王 邱

11.12 APPENDIX 12: PROJECT AREA OF THE PROPOSED PROJECT

