



**ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR THE PROPOSED
EXTENSION OF TAILINGS STORAGE FACILITY (TD15G-1) BY SINO-METALS
LEACH ZAMBIA LIMITED IN CHAMBISHI, KALULUSHI DISTRICT,
COPPERBELT PROVINCE**

JULY 2026

PREPARED BY



Executive Summary

Project Background

Sino-Metals Leach Zambia Limited (SMLZ) is a Zambian-incorporated company under PACRA and a subsidiary of China Nonferrous Metal Mining (Group) Co., Ltd. (CNMC). The company operates a copper concentrator and hydrometallurgical complex in Chambishi, Kalulushi District, Copperbelt Province. The existing Tailings Storage Facility (TD15G) is a flat-type pond with a total storage capacity of 1.836 million m³ and an area of approximately 130,000 m². The construction of the tailings pond commenced in May 2023 and was completed in December 2024. The TSF is a Class IV tailings pond and was put into use in January 2026 and is currently operational.

To ensure long-term tailings management for the remaining ore (approximately 6 million tonnes) and to avoid the need for future greenfield development, Sino-Metals Leach Zambia Limited now proposes to extend the existing TSF by extending the northern and southern embankments and constructing a new western embankment. The expanded tailings pond will be called TD15G-1. The total storage capacity of the combined TD15G-1 facility will be 5.48 million m³ (effective capacity 4.76 million m³) and cover an area of 0.47km².

Project Description

Tailings Delivery System

Tailings from the existing leaching plant will be pumped via a dedicated HDPE pipeline (approximately 0.225 m diameter) to the proposed combined Tailings Storage Facility TD15G-1 (existing Pond G plus western extension). The slurry will be discharged at a solids content of approximately 50%, which is thick enough to minimise free water yet sufficiently fluid for reliable pumping without settling. The pipeline will be supported on concrete piers as required, with manual shut-off valves, and inspected daily. This method eliminates road transport of tailings, avoiding traffic disruptions, road damage, and spillage risks.

Embankment Material Sourcing and Borrow Pit

The borrow pit for the embankment construction will be located within the mine lease area. The silty clay material will be excavated from this designated pit to supply the required fill for the rolled earth-rock dam. The pit is not intended to modify the specified TSF footprint or storage capacity; its sole purpose is earth material sourcing. The borrow pit will be developed in a controlled manner to ensure material quality and minimise environmental disturbance. Based on the embankment volume requirements (approximately 930,000 m³ of compacted fill, as per the FSR cost estimate), the borrow pit area is expected to be of sufficient size to meet the project's material needs.

Design Capacity and Footprint

The combined Tailings Storage Facility G-1 is designed with a total storage capacity of 5.48 million m³ (effective capacity 4.76 million m³). The facility comprises the existing Pond G (area ~130,000 m², capacity 1.836 million m³) and a western extension area where new embankments will be constructed on the north, west, and south sides. The internal shared embankment on the

west, north, and south sides of Pond G will be demolished to create a single, integrated pond. The maximum dam height is 22.5 m, and the facility is classified as a Class IV tailings pond.

Embankment Design

The embankment will be constructed as a rolled earth-rock dam using locally sourced silty clay (from within the pond area and from demolition of existing embankment). The fill will be placed in lifts (typical 200–300 mm) and compacted to at least 96% of standard Proctor maximum density. The dam crest elevation is 1340 m with a crest width of 5 m. A 5 m wide berm is provided at elevation 1325 m on the outer slope. Inner slope ratio is 1:2.5; outer slope ratios are 1:2.5 for north and west dams and 1:3.0 for the south dam. An independent geotechnical engineer will certify the design, with minimum factors of safety meeting GB39496-2020 requirements for Class IV ponds.

Lining System (Anti-Seepage)

The entire pond area (both existing Pond G and the western extension) will be equipped with a 1.5 mm thick HDPE composite geomembrane anti-seepage layer. The geomembrane will be laid over the prepared subgrade and anchored at the dam crest and the 1330 m inner slope platform. The existing geomembrane from the demolished emergency pools may be reused after quality inspection. This single-layer HDPE system effectively prevents seepage of tailings liquor into the foundation, protecting underlying groundwater.

Leak Detection and Underdrainage System

The HDPE geomembrane lining system is designed as the primary barrier against seepage. To manage any potential minor seepage that may bypass the liner through construction defects or damage, drainage blind ditches are provided at 50 m intervals at the dam bottom, connected to a drainage prism at the outer toe (2 m height above ground, 1 m buried, slope 1:1.5, top width 1.5 m). Any seepage water that reaches the drainage system is collected in the toe drainage ditch and can be pumped back to the plant if necessary. No automated alarm sump is required; manual inspection of drainage outfalls and the toe ditch is performed regularly. Routine visual inspections and groundwater monitoring (3 wells) provide additional assurance of liner integrity.

Water Management System

During the normal production of the tailings pond, the tailings water in the pond is not discharged externally. It is pumped to the plant area for reuse through the water pump in the pond, and the water level in the pond is controlled. A spillway-type flood discharge system is provided at the top of the south dam and is composed of an overflow weir at the dam crest, a steep chute on the dam slope, a stilling basin at the dam toe, and a drainage ditch downstream. The drainage ditch finally leads to the existing downstream 7 silt traps and 3 Pollution Control Dam (PCD). The above-mentioned flood discharge facilities are all of C30 reinforced concrete cast-in-situ structure. With a bottom elevation of 1338m at the dam crest, the overflow weir is a box - culvert structure with a rectangular cross-section and a net size of 2.0m (width) × 1.0m (height); the net cross-section size of the steep chute is 1.0m (width) × 1.0m (depth); the net cross-section size of the stilling basin is 5.0m (length) × 2.0m (width) × 1.5m (depth); the net cross-section size of the drainage ditch is 1.0m (width) × 1.0m (depth).

Monitoring Programme

The tailings pond will be equipped with manual safety monitoring facilities as follows:

- Dam surface displacement: 8 observation points
- Seepage line (piezometers): 8 observation points
- Pond water level: 1 observation point

Monitoring frequency: daily visual inspections during operation; displacement and seepage readings taken weekly during construction and monthly thereafter. Groundwater monitoring: 3 wells located at the outer toe of the north, west, and south dams, sampled quarterly for heavy metals and physico-chemical parameters. Results are reported to ZEMA and the Ministry of Mines every six months. An online safety monitoring system may be added separately.

Location

The proposed project site is located in Chambishi area of Kalulushi district, Copperbelt Province. The Kalulushi Central Business District (CBD) is located about 22Km South of the proposed project site. The proposed site of the TD15G-1 is located on the west side of TD15G. To the immediate east of TD15G, there is pond F. There is an external access road about 200m to the north and 150 m- 550 m to the west of TD15G.

Other nearby landmarks include the Chingola-Kitwe Road located about 500m, Eco Petroleum Filling Station located about 2.12Km North East of the project site, Cosak Substation CEC located about 1.95Km North East of the proposed project site, Chambishi Metals located about 1.39Km east of the proposed project site, and JCHX Mining Limited located about 3.21Km South East of the proposed project site.

Table 1: site corner coordinates

Point No.	Longitude (°)	Latitude (°)
G1	28.02719142	-12.63920904
G2	28.02726446	-12.63887517
G3	28.02479501	-12.63768680
G4	28.02308843	-12.63686554
G5	28.02236308	-12.63693373
G6	28.02210581	-12.63735971
G7	28.02156786	-12.64077567
G8	28.02096347	-12.64497071
G9	28.02366686	-12.64512404
G10	28.02583740	-12.64522136
G11	28.02635648	-12.64529147
G12	28.02672526	-12.64545359

Objectives of the project

To construct and operate the combined Tailings Storage Facility as a fully engineered tailings management facility that adequately contains tailings from the leach plant, safeguards groundwater and soil resources through a 1.5 mm HDPE composite geomembrane anti-seepage layer and protects public health in the surrounding host community.

Specific Objectives

- To sustainably operate the leach plant with integrated tailings management.
- To provide ZEMA, the Ministry of Mines, and relevant stakeholders with a comprehensive environmental and social impact assessment as a basis for granting final ESIA approval.
- To create approximately 150 construction jobs and 5 permanent operational positions from the host community of Kalulushi District.
- To generate public revenue through continued copper production, including taxes, royalties, and local levies that support district and national development.

Investment cost

The proposed project is estimated to have an investment cost of US\$7.5162 million.

Implementation date

The proposed project is expected to be implemented on 30th September 2026.

Project lifespan

The lifespan of the project is expected to be 10 years

Project Schedule

Activity	2026	2027	2038
Site Preparation	August		
Mobilization of equipment	September		
Construction of new rolled earth-rock embankments	September		
Installation of sub-membrane drainage layer	October		
Installation of groundwater monitoring facilities	October		
Operation	November	(10 years)	
Decommissioning			2 years

Project rationale

The proposed TSF extension (combining the existing Pond G with a new western extension to form Tailings Storage Facility G-1) serves a twofold rationale: first, to protect immediate environmental components – particularly groundwater resources and surrounding soil – from contamination through the installation of a 1.5 mm HDPE composite geomembrane anti-seepage layer and a sub-membrane drainage system, thereby enhancing long-term sustainability; second, to foster responsible economic development by ensuring uninterrupted tailings management capacity for the leaching plant to store tailings from the remaining approximately 6 million tonnes

of ore, enabling continued copper processing and value addition while creating 150 construction jobs and 5 permanent operational positions.

Legal framework

Regulatory framework and corporate requirements

A number of relevant local and international Acts and Regulations relating to environmental conservation and protection have been considered with respect to the proposed project. The following are the relevant regulations: -

Local Legislation

- The Statutory Instrument No. 3 of 2026
- The Environmental Management Act, Cap 204 of the laws of the Laws of Zambia
- Statutory Instrument No. 112 of 2013; Part II on Air and Water pollution (Licensing) Regulations
- Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 part III
- Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 Part II
- Environmental Management (Licensing) Regulations, Statutory No.112 of 2013 Part IV
- Minerals Regulation Commission Act No. 14 of 2024
- Mines and Minerals (Environmental) Regulations, SI No. 29 of 1997
- Urban and Regional Planning Act, 2015 PART III section 17
- The Occupation Health and Safety Act of 2025 PART IV Section 16
- The Forest Act No 4 of 2015,
- The fisheries Act, No.22 of 2011 Part iv section 27
- The Zambia Wildlife Act No.14 of 2015
- Public Health Act Cap 295 of 1978 Part V Section 31
- The Local Government No. 2 of 2019 Section 16
- The Water Resources Management Act No. 21 of 2011 Section 6
- The National HIV/AIDS/STI/TB Act of 2002 Section 4
- The National Heritage and Conservation Act (Cap.173 of 1989) Section 8
- Employment Code Act, 2019
- Employment Code Act, 2019 Division 7.3 - Minimum wages and Conditions of Employment section 105
- Workers Compensation Act No. 10 of 1999 Section 6
- The Road Traffic Act 2002
- The Lands Act (Cap. 184 of 1995) Section 8

- The Pneumoconiosis Act No. 13 OF 1994
- Ionising Radiation Act No.16 of 2005
- The National council for construction Act No. 10 of 2020

International Policy Framework

Zambia is a signatory and party to so many international conventions and protocols. The following are some of the international conventions and/or protocols that will be reviewed during the EIA process:

- UN Convention on Climate change
- UN Convention on Biological Diversity
- Rio Declaration on Environment and development
- Convention on Control of Trans boundary Movements of Hazardous Wastes and their disposal
- UN Convention to Combat Desertification
- Convention on Wetlands of International Importance, e.g. Waterfowl Habitat
- Convention on the Protection of World Cultural and Natural Heritage
- Convention on International Trade in Endangered Species of Wild Flora and Fauna
- Convention on Migratory Species (CMS)
- The Ramsar Convention

Project Alternatives

The alternatives considered for the project are; no project option, site location alternatives, raw material alternatives, technology alternatives, process alternatives, domestic and sanitary waste management, and By-product handling alternative.

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.

Climatic Conditions

The project site is situated in **Agro-Ecological Zone III**, characterized by high annual rainfall and a subtropical climate. The year is divided into three distinct seasons: the cool-dry season (May–July), the hot-dry season (August–October), and the warm-humid rainy season (November–April). Average annual rainfall is approximately **1181 mm** (FSR Section 2.3), with the majority falling between November and March. Typical rainfall processes are mostly showers of 10-40 mm, with maximum monthly rainfall of 569.5 mm.

Climatic Conditions

Parameter	Statistical Value	Description / Seasonality
Mean Annual Rainfall	~1,181 mm	Peak rainfall occurs December–March
Average Temperature	19.9°C – 21°C	Mean annual temperature across all seasons
Max Temperature (Hot)	22°C – 35°C (up to 37°C extreme)	Occurs in October (hottest month)
Min Temperature (Cool)	8°C – 27°C	Occurs in July (coolest month); occasional frost
Relative Humidity	59% – 81%	Lower during dry season; higher during wet season
Prevailing Wind Direction	Northeast to East	Primary direction (FSR Section 2.3)
Mean Wind Speed	~10 km/h (2.9 m/s)	Annual mean
Annual Evaporation	48 – 295 mm (mean 170.5 mm/year)	Potential evapotranspiration varies seasonally

Precipitation and Evaporation

Rainfall occurs mainly from October to April, with the majority falling between December and March. The 84-year average precipitation for a 24-hour event has been recorded at 28.6 cm in January, with the lowest being 0.2 cm in September. Evaporation for the region ranges from 48 mm to 295 mm, with an average of 170.5 mm per year.

Air Quality

The proposed project site is in a mining and industrial area, characterized by copper processing companies such as Chambishi Metals and NFCA, and other heavy industries. The air quality is largely influenced by industrial activities and vehicular activity along the nearby Chingola-Kitwe Road.

From the air quality monitoring conducted at the site, the following measurements were taken:

Air Quality Monitoring Results

Location	Coordinates	Elevation (m)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	CO ₂ (ppm)	Temperature (°C)	Humidity (%)	Noise – Min (dB A)	Noise – Max (dB A)	Remarks
Point A	-12.64295 / 28.02488	1344	24.7	35.1	399	21	48	52.2	64.4	Moderate
Point B	-12.64702 / 28.02398	1132	22.3	33.8	466	22	45	47.3	51.5	Good
Point C	-12.64500 / 28.02644	1304	27.2	40.0	452	–	–	52.3	65.0	Moderate
Point D	-12.64203 / 28.02623	1334	29.7	36.9	–	–	–	42.7	54.4	Moderate

Note: All measured parameters fall within ZEMA statutory limits for ambient air quality in industrial areas. PM_{2.5} and PM₁₀ levels indicate moderate air quality, typical of an active mining and industrial zone.

Noise Environment

The current sources of noise at the project site arise mainly from surrounding heavy industries within the site vicinity. Baseline noise measurements indicate ambient noise levels ranging from **42.7 dBA to 65.0 dBA**, depending on proximity to industrial operations and vehicle traffic along the Chingola-Kitwe Road. The lower readings (42.7–52.3 dBA) were recorded at points further from active industrial sources, while the higher readings (64.4–65.0 dBA) were recorded near the access road and industrial facilities. The general industrial noise levels at the site have an average level of approximately **55 dB**, which is within typical ranges for an industrial area.

Topography

The proposed site is relatively flat and slopes gently towards the southern direction. The existing tailings pond (TD15G) is located at an altitude of **1286–1342 m**, with the terrain higher in the north and lower in the south. The western extension area (proposed site) has elevations of **1316–1333 m**, also higher in the north and lower in the south. Monitoring point elevations ranged

from **1132 m** (Point B, lower-lying area) to **1344 m** (Point A, higher ground). The area occurs about 1255 m above sea level in the broader region.

Soils

The site has soil typical of the Copperbelt Province: red lateritic soils, sandy topsoils overlying more loamy clayey subsoil. These soils are susceptible to erosion by rainwater if soil conservation practices are not used. Because of high rainfall (Agro-Ecological Zone III), the soils are strongly leached, have a low reserve of plant nutrients, and low base saturation. The soils are acidic with pH ranging from **4.0 to 5.5**, with no discernible change in pH to a depth of about 3 m. The site area has red lateritic soils with a loamy clayey sub-layer.

Hydrology and Drainage

The nearest surface hydrological resources include **Chambishi stream** located about **7.65 km south** of the proposed project site, and **Lulamba stream** located about **1.75 km north**. The natural drainage course runs from north-west to south-east, leading to the **Mwambashi River**. Intermittent and ephemeral drainage courses around the project site drain into the Chambishi stream, which subsequently drains into the Mwambashi River near Sabina area. The Mwambashi River is part of the dendritic perennial flows of the **upper Kafue River basin**, commanding storm drainage to flow south-east toward the Kafue River. The Mwambashi River drains into the Kafue River about **15 km south-east** of the project site at Ganerton in Kitwe District.

Geology of the Area

The project site is underlain by the **pre-Cambrian Lufubu super-group** consisting of Lufubu schists and gneisses, with granitic intrusion bodies dating as far back as 1,975 million years (Cahen et al., 1970). These bodies intrude into the Lufubu super-group and the pre-Cambrian Muva super-group (mainly quartzites). The site geology is characterized by widespread low-grade copper mineralization, which is common in these granitic bodies, with the immediate surrounding area having high-grade copper mineralization where mining activities currently take place. The regional strata belong to the **lower Roan Sub-group**, including conglomerates and sandstones.

Ecological Resources

Fauna

No large animals are reported to be seen on the site except for some insects and small mammals. The following are some of the terrestrial species seen and/or reported to be present on site:

Reported/Sighted Fauna around Project Site

SN.	Scientific Name	Common Name
1	<i>Melanoplus bivittatus</i>	Grasshopper
2	<i>Mantis religiosa</i>	Praying mantis
3	<i>Agelenopsis aperta</i>	Grass spider
4	<i>Lacertilian</i>	Lizards
5	<i>Ratus</i>	Rats

There are no rare or endangered terrestrial species seen or reported to be present on site.

Bird Species

Within the site no birds were noticed; however, from consultations, the following bird species occur around the site and have been observed within the area: common bulbul (*Pycnonotus barbatus*), zitting cisticola (*Cisticola juncidis*), marsh warbler (*Acrocephalus palustris*), and streaky seedeater (*Serinus striolatus*). There are no endangered bird species.

Aquatic Fauna Fish Species reported in Mwambashi River

Common Name	Scientific Name	Max Length (cm)
Vundu	<i>Heterobranchus longifilis</i>	150
Three-spot Tilapia	<i>Oreochromis andersonii</i>	60
African Pike	<i>Hepsetus odoe</i>	70
Cornish Jack	<i>Mormyrops anguilloides</i>	150
Eastern Bottlenose	<i>Mormyrus longirostris</i>	75
Yellow-belly Bream	<i>Serranochromis macrocephalus</i>	42
African Lungfish	<i>Protopterus annectens</i>	100
Thinface Bream	<i>Serranochromis angusticeps</i>	41
Longfin Tilapia	<i>Oreochromis macrochir</i>	43
Rednose Labeo	<i>Labeo altivelis</i>	40
Zambezi Parrotfish	<i>Hippopotamyrus discorhynchus</i>	31
Imberi	<i>Brycinus imberi</i>	19
Northern Dwarf-Squeaker	<i>Synodontis nigromaculatus</i>	39
Kafue Pike	<i>Hepsetus cuvieri</i>	30

There are no endangered species in the nearby stream.

Flora

The site has vegetation mainly comprising grass, *Isberlinia angolensis* (Benth.), *Brachystegia longifolia* (Mupuchi), *Afzelia quanzensis* (Mupapa), *Pterocarpus angolensis* (African teak), and *Pteridium aquilinum* (fern). The area is largely wasteland with minimal vegetation, surrounded by existing industrial operations. There is no endangered flora on site.

Vegetation Type in the Project Area

Aquatic Flora

Aquatic flora species identified in the Mwambashi River include: water hyacinth (*Eichornia crassipes*), cattail (*Typhaceae*), water clover (*Marsileaceae*), water lily (*Nymphaeaceae*), mosquito ferns (*Salviniaceae*), phragmites (*Molinieae*), and parrot's feather (*Myriophyllum aquaticum*). There are no endangered or rare species identified at the site.

Land Use

The proposed area is one of the fastest-growing industrial areas in the country, as it is a designated mining area characterized by a chain of locally and foreign-owned mineral processing companies, namely Chambishi Metals, NFCA, and other heavy industrial entities. The site is classified as state land under the Kalulushi Municipal Council, held under a mining lease by Sino-Metals Leach Zambia Limited.

Built Environment

The Kalulushi Central Business District (CBD) is located about **22 km south** of the proposed project site. The **Chingola-Kitwe Road (T3)**, located about **500 m** away, is the nearest access road. Other nearby landmarks include Eco Petroleum Filling Station (about 2.12 km north-east), Cosak Substation CEC (about 1.95 km north-east), Chambishi Metals (about 1.39 km east), and JCHX Mining Limited (about 3.21 km south-east).

Social, Economic and Cultural Issues

Social Economy

The mine is one of the main sources of employment in the area. Subsistence farming involving arable and livestock farming is another substantial source of income. The local economy is historically and presently dominated by mining and its associated industries, but agriculture remains a critical source of subsistence and income, especially in the surrounding rural wards. Agriculture is the primary livelihood for much of the population, particularly in rural wards like Mwambashi and Musakashi.

Administration

The district operates under a dual system of governance:

- **Central Government:** Headed by the District Commissioner, who coordinates all government functions and developmental activities.
- **Local Government:** Kalulushi Municipal Council, headed by an elected Mayor, is responsible for local policy and development. The district is divided into one constituency (Kalulushi) and 24 wards, each represented by an elected councillor.

The area has one Member of Parliament, the mayor, District Commissioner, and a Municipal Council that handles social, economic, agricultural, and health issues of the town and areas falling under the municipal council.

Population Growth Rate, Density and Distribution

Kalulushi District's population has demonstrated consistent growth, increasing from 96,206 in 2010 to 170,918 in 2022, reflecting an average annual growth rate of 2.9%. The specific population of the Chambishi area is **54,865** (ZAMSTATS, 2022). Population density is unevenly distributed, with higher concentrations in urban and peri-urban wards (Twaiteka, Sitwe, Lulamba, and Chambishi) due to economic activities, and lower densities in rural wards (Lukoshi, Musakashi, and Mwambashi). A notable trend of rural-urban migration, driven by the search for employment and services, continues to shape this distribution.

Table 6.5: Population Distribution in the 7 Wards

Item	Ward	Population
1	Chambishi	8,169
2	Lukoshi	1,480
3	Lulamba	11,507
4	Musakashi	894
5	Mwambashi	4,405
6	Sitwe	11,917
7	Twaiteka	16,493
Total		54,865

The district has a youthful population pyramid, with a significant proportion of inhabitants under the age of 35. This demographic structure implies a large current and future working-age population, presenting a potential demographic dividend for economic growth. The population is nearly evenly distributed by sex, with a slight female majority (86,613 females to 84,305 males).

Archaeological Site and Cultural Tradition

No historical or archaeological resources were observed within the license area during the baseline assessment. There were no notable materials of cultural or historical significance identified.

Chance Find Procedure: In the event that any archaeological or cultural heritage materials are discovered during exploration activities (e.g., trenching, drilling), work in the immediate vicinity will cease, and the National Heritage Conservation Commission (NHCC) will be notified immediately for assessment and direction.

Land Tenure

All land within the boundaries of Chambishi is classified as state land. There is no customary land in the township. The Kalulushi Municipal Council (KMC) holds delegatory powers under the Lands Act to plan and administer land within the district, excluding areas administered under the Minerals Regulation Commission Act and the Forests Act.

Interested and Affected Parties

Interested and affected parties identified are:

- Chambishi Metals Plc and NFCA Mining Plc and their employees
- Companies providing goods and services to Sino-Metals
- Municipal council and its employees
- Government employees
- Local communities in Chambishi

Environmental and social Impacts Enhancement and Mitigation measures

The potential impacts of the integrated mining operations have been meticulously identified using a standardized impact matrix. Mitigation measures have been developed following the "Mitigation Hierarchy" (Avoid, Minimize, Restore, and Offset) to ensure that the project maintains its social license and environmental integrity.

The following positive impacts are anticipated from the proposed project. These impacts are expected to improve the socio-economic conditions of the local communities and contribute to national development objectives.

ID	Impact Category	Description	Enhancement Measures
P1	Provision of Employment	The TSF extension project will provide direct employment for approximately 150 construction workers (during the 6–8 month construction phase) and 5 permanent operational staff (during the 10-year operation phase). Priority will be given to local residents from Chambishi and surrounding wards (Mwambashi, Lulamba, etc.).	Develop a local recruitment policy that prioritises qualified candidates from Kalulushi District. Provide on-the-job training and skills transfer in earthworks, HDPE liner installation, embankment compaction, and monitoring.
P2	Increased Public Revenue	The project will contribute to public revenue through Pay As You Earn (PAYE) for employees, corporate tax, VAT on construction materials, and local taxes/rates payable to Kalulushi Municipal Council.	Ensure timely and accurate remittance of all statutory contributions. Maintain transparent financial records for audit purposes.
P3	Multiplier Effects on Local Economy	The project will boost local economic activity through procurement of goods and services from local suppliers (e.g., sand, gravel, cement, protective wear, catering). Workers' spending will generate additional economic benefits in Chambishi and Kalulushi.	Encourage contractors to purchase materials from local vendors. Engage local subcontractors where feasible. Document local procurement to demonstrate economic benefits.
P4	Skills Transfer and Capacity Building	Local workers will gain valuable skills in rolled earth-rock embankment construction, HDPE geomembrane laying, spillway construction, groundwater monitoring, and environmental	Implement a structured training programme for all local workers. Provide certificates of completion for training. Document skills development outcomes.

		management. These skills are transferable to future mining and civil works.	
P5	Responsible Tailings Management (Zero Discharge)	The fully lined TSF (1.5 mm HDPE geomembrane) will enable recycling of decant water back to the leach plant, achieving zero discharge under normal operations and reducing freshwater abstraction.	Maintain the liner and water recycling system according to design specifications. Monitor groundwater (3 wells) quarterly to verify no seepage. Report water balance annually to ZEMA and WARMA.
P6	Post-Closure Land Rehabilitation	After decommissioning, the tailings surface will be capped with loam and planted with native grass, restoring the site to a stable, vegetated landform, reducing long-term environmental liability, and improving local aesthetics.	Implement the closure plan as approved. Maintain the vegetation for at least 2 years after planting. Conduct post-closure monitoring for a minimum of 5 years.

Negative Impacts and Mitigation Measures

ID	Impact Category	Description	Mitigation Measures	Responsible Party
SE1	Increased Spread of HIV/AIDS and STIs	The influx of approximately 150 construction workers (and subsequent 5 permanent staff) may increase the risk of HIV/AIDS and other sexually transmitted infections among workers and the local community.	Conduct mandatory HIV/AIDS awareness programmes for all workers. Distribute free condoms in male and female toilets. Encourage voluntary testing and provide referrals to local health facilities.	Human Resources, SHEQ Manager
SE2	Increased Risk of Malaria and Other	Workers living in temporary accommodation and the local	Provide mosquito nets for workers where accommodation is provided. Ensure no stagnant	SHEQ Manager, Site Supervisor

	Communicable Diseases	community may be exposed to malaria, particularly during the rainy season. Stagnant water from construction activities could create mosquito breeding sites.	water accumulates on site (fill depressions, drain standing water). Maintain good hygiene practices. Provide information on malaria prevention to workers.	
SE3	In-Migration and Pressure on Local Services	Job seekers may be attracted to Chambishi area, potentially increasing pressure on local services such as health facilities, water supply, and schools.	Implement a local recruitment policy (priority to Kalulushi District residents). Engage with Kalulushi Municipal Council and health facilities to coordinate support. Monitor any changes in service utilisation.	Human Resources, Community Liaison Officer
SE4	Traffic Safety Risks	Increased vehicle movements (trucks, water bowsters, excavators) on access roads may pose safety risks to pedestrians, cyclists, and other road users.	Install appropriate road signage (speed limits, caution signs). Enforce speed limits (max 20 km/hr on gravel roads). Conduct driver safety training. Use a traffic management plan during construction. No tailings transported by road.	Safety Officer, Site Manager
EN1	Air Pollution (Dust and Emissions)	Dust generation from site clearing, earthworks, demolition of internal embankments, vehicle movements, and wind erosion from exposed areas. Gaseous emissions from construction machinery and pumps.	Water bowser spraying on all active work areas and access roads. Limit vehicle speed. Provide dust masks to workers. Maintain machinery to minimise emissions. Restrict high-dust activities during high winds where possible.	SHEQ Manager, Site Agent
EN2	Noise Pollution	Elevated noise levels from excavators, compactors, trucks, demolition, and	Use modern, well-maintained equipment. Provide hearing protection (earplugs, earmuffs)	SHEQ Manager, Site Agent

		construction activities. Operational noise is minimal (pipeline). Potential disturbance to nearby communities (Chambishi, Mwambashi).	to workers. Limit construction activities to daytime hours where feasible. Conduct noise monitoring at site boundaries.	
EN3	Contamination of Surface Water	Risk of sediment-laden runoff from exposed areas entering Chambishi stream (7.65 km south) or Lulamba stream (1.75 km north). Potential hydrocarbon spills from machinery.	Construct perimeter diversion ditches (V-shaped, lined) to divert clean runoff away from the TSF. Schedule earthworks during dry season where possible. Use spill kits and refuel in designated bunded areas. Zero discharge under normal operations.	Site Environmental Manager, Site Agent
EN4	Contamination of Groundwater	Potential seepage of tailings liquor through the liner if defects occur. Risk of hydrocarbon infiltration from fuel or oil spills.	Use 1.5 mm HDPE composite geomembrane as primary barrier. Install 3 groundwater monitoring wells (north, west, south outer toes) and sample quarterly. Implement spill prevention and response procedures.	Site Environmental Manager, SHEQ Manager
EN5	Loss of Biodiversity	Minimal vegetation loss on the 17-ha western extension area (currently wasteland). No endangered species identified. Temporary disturbance to birds and small fauna from noise and human presence.	Limit clearing to the required footprint. Avoid clearing of any trees with bird nests during breeding season (where possible). Prohibit hunting or trapping of wildlife (including birds). Report any rare species sightings to Department of National Parks and Wildlife.	SHEQ Manager, Site Agent
EN6	Soil Contamination	Potential spills of hydrocarbons (diesel, oil) during refuelling or	Store fuel and oils in bunded areas (110% containment). Use drip pans during refuelling.	SHEQ Manager, Site Agent

		machinery maintenance. Risk of tailings leakage if liner fails (mitigated by design).	Maintain spill kits on site. Collect used oil and hazardous waste for disposal by licensed contractor. Line the entire TSF with 1.5 mm HDPE geomembrane.	
EN7	Solid Waste Generation	Construction waste (HDPE offcuts, concrete, packaging, demolition debris) and domestic waste (food waste, paper, plastics) from workers.	Segregate waste at source (hazardous vs non-hazardous). Reuse excavated material as embankment fill where possible. Dispose of non-hazardous waste at Kalulushi Municipal Council designated landfill. Hazardous waste (used oil, contaminated HDPE) managed under SI No. 112 Part IV.	Site Supervisor (Waste), SHEQ Manager
EN8	Land Degradation and Land Use Change	Permanent change of land use from wasteland to industrial TSF (irreversible). Temporary disturbance from earthworks and demolition.	Keep disturbance to the minimum footprint. Topsoil stripping for later use in closure. After decommissioning, cap with loam and plant native grass to restore vegetative cover. Maintain perimeter fence to prevent unauthorised access.	SHEQ Manager, Closure Specialist
EN9	Visual and Landscape Disturbance	The new embankments (max height 22.5 m) and lined pond will alter the local landscape in an already industrial area.	Design slopes to blend with natural topography where possible. Final closure includes capping and grass planting to improve aesthetics. Maintain security fencing and signage.	Site Manager, Closure Specialist
EN10	Occupational Health and Safety Risks	Workers exposed to hazards: dust, noise, heavy machinery, working at	Provide full PPE (helmets, gloves, boots, hi-vis, dust masks, hearing protection). Conduct daily toolbox talks and safety inductions. Appoint a	SHEQ Manager, Site Agent

		heights (embankments), manual handling, and potential slips/trips.	dedicated safety officer. Implement emergency response plan.	
EN11	Fire Risk	Bush fires could start from machinery sparks, fuel handling, or camp activities, affecting surrounding vegetation and nearby communities.	Maintain a fire break around the TSF and camp area. Prohibit open fires and bush burning. Provide fire extinguishers at strategic locations (fuel storage, plant, office). Train workers in fire prevention and response.	SHEQ Manager, Safety Officer
EN12	Embankment Stability and Dam Safety	Risk of slope failure, settlement, or overtopping during extreme flood events (0.5% exceedance probability).	Engineered design with slopes 1:2.5 (north/west) and 1:2.75 (south). Spillway on south dam crest to safely convey floods. Manual monitoring: 8 displacement points, 8 seepage points, 1 water level point. Independent geotechnical review.	Senior Geotechnical Engineer, SHEQ Manager
EN13	Post-Closure Long-Term Seepage	Potential long-term seepage if HDPE liner degrades over time (e.g., after 50+ years).	1.5 mm HDPE geomembrane designed for durability. Post-closure groundwater monitoring (3 wells) for at least 5 years. Maintain records for regulatory review. If seepage detected, implement remediation plan.	SHEQ Manager, Closure Specialist

Conclusion and recommendations

By considering the positive impacts associated with the proposed project and comparing with the negative ones, together with appropriate enhancement and mitigation measures respectively, it was concluded that the proposed project can be managed to ensure the all benefits are realized and that the environment and local communities are not impacted on adversely.

Based on the EIA process carried out for this project, the consultant has made the following recommendations:

1. The proposed project should be implemented in compliance with the regulatory framework and corporate requirements as highlighted in the report while upholding good management practice and unquestionable environmental stewardship.
2. The developer should consider all identified potential positive and negative impacts and implement all the proposed enhancement and mitigation measures respectively.
3. The Zambia Environmental Management Agency (ZEMA) should consider and approve the proposed project.

SIGNATURES OF EXPERTS

Table 2: proposed EIA team and responsibility of the team members

S/ N	Name and Qualification	Field of Expertise	Role in EIS	Signature
1.	Moses Mutambala B.Eng. Metallurgical Engineering at the Copperbelt University and University of Zambia	Lead Consultant	Process description, legal, Environmental and Socio Management Plans and Monitoring Plans	
2.	Kabwe Chanda B.Eng. Environmental Engineering at the Copperbelt University	Environmental and Social Safeguards	Develop Project Specific Social and Environmental Impact Matrix and Mitigation measures, Management Plans and Monitoring Plans	
3.	Wisdom Chasaya • Bachelor of Arts Degree in Social Studies: Catholic University of Eastern Africa, Nairobi, Kenya • Diploma in Social communication for development: Tangaza University College, Nairobi Kenya • Certificate in Public Speaking : Toastmasters Club, Pretoria, RSA • Diploma in Theology :Tangaza University	Social Communication Specialist/ Project Management	Socioeconomic assessments	

	College, Nairobi, Kenya Diploma in philosophy : St Francis College, Pretoria, RSA			
4.	Musosha Mwelwa - MSc Environmental Management, University of Queensland, Australia. - BSc Forestry, Copperbelt University, Zambia	Ecological Survey Expert	Ecological Assessments of terrestrial and aquatic fauna and flora.	
5.	Suwilanj Sinkamba B.Eng. Civil Engineering at the Copperbelt University	Geotechnical and Structures analysis expert	Analysis of TSF stability	
6.	Beauty Banda - Doctorate of Philosophy candidate in Renewable Energy, University of Zambia - Master of Science in Water Management, Addis Ababa University, Addis Ababa, Ethiopia - Bachelor of Engineering in Environmental Engineering, Copperbelt University, Kitwe, Zambia	- Hydrology Survey Expert - GIS Mapping	Hydrological modelling using GIS and remote sensing, Site surface drainage Spatial analysis	

NON-TECHNICAL SUMMARY

Sino-Metals Leach Zambia Limited is a Zambian-incorporated company under PACRA and a subsidiary of China Nonferrous Metal Mining (Group) Co., Ltd.(CNMC). The company operates a copper concentrator and hydrometallurgical complex in Chambishi, Kalulushi district, Copperbelt Province. The existing Tailings Storage Facility (TD15 G), a flat-type pond with a total storage capacity of 1.836 million m³ and an area of about 130,000 m². The construction of the tailings pond commenced in May 2023 and was completed in December 2024. After the construction, the vertical height of the dam slope is approximately 20-22m on the east side, 19-20m on the south side, 20-22m on the west side, and 22.3m on the north side. The TSF is a Class IV tailings pond and was put into use in January 2026 and is currently operational.

To ensure long-term tailings management for the remaining ore (approximately 6 million tonnes) and to avoid the need for future Greenfield development, Sino-Metals Leach Zambia Limited now proposes to extend the existing TSF by extending the northern and southern embankments and constructing a new western embankment. The expanded will be called TD15G-1. The internal shared embankments between TD15G and TD15G-1 will be lowered to combine the storage capacity, to form a single, larger Tailings Storage Facility. The total storage capacity of the combined TD15G-1 facility will be 5.48 million m³ (effective capacity 4.76 million m³) and cover an area of 0.47km².

UBULONDOLOSHI BWAMIBOMBELE MUKWANGUFYANYA

Ba Sino-Metals Leach Zambia Limited kampani akalembesha kuciputulwa cabuteko icaba NAPSA pamo nga kampani kamu calo Cha Zambia. Aka Kampani musambo wa kampani umukalamba ngashi uweshina lya China Nonferrous Metal Mining (Group) Co., Ltd (CNMC). Aka kampani kaba Sino-Metals Leach Zambia Limited kaibimba kalelenakale mumibombebele shalekana lekana pango nga ukwimba kwamabwe yamukuba, kabili nokusungulula nangula ukusangulula. Eico aka kampani kalefwaisha ukupa icishiba camatipa ayafuma kumulimo wakusungulula umukuba, kabili uyu umulimo wakukusha icishiba cakale ukwebati cilinge nemilimo yakusungununa umukuma apakalamba ngashi, kanshi ngani kufipendo fyakwishiba ubukulu bwacishiba camatipa cikalasunga amatipa ukufika kuli 1.836 million m³ kamili icende yonse iyikasendwa pakupanga ici icishiba ikafika kuli 130,000 m².

Conclusion

The proposed extension of the Tailings Storage Facility (TD15G to TD15G-2) by Sino-Metals Leach Zambia Limited is a necessary project that provides additional tailings storage capacity for the remaining 6 million tonnes of ore, designed with a 1.5 mm HDPE composite geomembrane liner, drainage blind ditches to achieve zero discharge under normal operations, while creating approximately 150 construction jobs and 5 permanent positions. The Environmental and Social Impact Assessment has identified potential impacts that can be effectively managed through the proposed mitigation measures, and the project complies with all relevant Zambian legislation, including the Environmental Management Act No. 12 of 2011 and S.I. No. 3 of 2026. Sino-Metals Leach Zambia Limited therefore respectfully requests approval of this Environmental and Social Impact Statement by the Zambia Environmental Management Agency (ZEMA).

DECLARATION

I, HAO BO being the Developer/project proponent, hereby declare that the information provided in this report is true to the best of my knowledge and shall provide any additional information that shall come to my notice in the course of processing this application.

Signature



Date 31st July, 2026

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ABBREVIATIONS AND ACRONYMS

EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EPB	Environmental Project Brief
EIS	Environmental Impact Statement
EPPCA	Environmental Protection and Pollution Control Act
NAPSA	National Pensions Scheme Authority
NEAP	National Environmental Action Plan
NISIR	National Institute for Scientific and Industrial Research
PAYE	Pay As You Earn
PPE	Personal Protective Equipment
VAT	Value Added Tax
ZEMA	Zambia Environmental Management Agency
ZESCO	Zambia Electricity Supply Corporation
ZRA	Zambia Revenue Authority

1. INTRODUCTION

1.1 Background of the project

Sino-Metals Leach Zambia Limited is a Zambian-incorporated company under PACRA and a subsidiary of China Nonferrous Metal Mining (Group) Co., Ltd. (CNMC). The company operates a copper concentrator and hydrometallurgical complex in Chambishi, Kalulushi district, Copperbelt Province. The existing Tailings Storage Facility (TD15 G), a flat-type pond with a total storage capacity of 1.836 million m³ and an area of about 130,000 m². The construction of the tailings pond commenced in May 2023 and was completed in December 2024. After the construction, the vertical height of the dam slope is approximately 20-22m on the east side, 19-20m on the south side, 20-22m on the west side, and 22.3m on the north side. The TSF is a Class IV tailings pond and was put into use in January 2026 and is currently operational.

To ensure long-term tailings management for the remaining ore (approximately 6 million tonnes) and to avoid the need for future Greenfield development, Sino-Metals Leach Zambia Limited now proposes to extend the existing TSF by extending the northern and southern embankments and constructing a new western embankment. The expanded will be called TD15G-1. The internal shared embankments between TD15G and TD15G-1 will be lowered to combine the storage capacity, to form a single, larger Tailings Storage Facility. The total storage capacity of the combined TD15G-1 facility will be 5.48 million m³ (effective capacity 4.76 million m³) and cover an area of 0.47km².

1.2 Project Description

1.2.1 Tailings Delivery System

Tailings from the existing leaching plant will be pumped via a dedicated HDPE pipeline (approximately 0.225 m diameter) to the proposed combined Tailings Storage Facility G-1 (existing Pond G plus western extension). The slurry will be discharged at a solids content of approximately 50%, which is thick enough to minimise free water yet sufficiently fluid for reliable pumping without settling. The pipeline will be supported on concrete piers as required, with manual shut-off valves, and inspected daily. This method eliminates road transport of tailings, avoiding traffic disruptions, road damage, and spillage risks.

1.2.2 Embankment Material Sourcing and Borrow Pit

The borrow pit for the embankment construction will be located within the mine lease area. The silty clay material will be excavated from this designated pit to supply the required fill for the rolled earth-rock dam. The pit is not intended to modify the specified TSF footprint or storage capacity; its sole purpose is material sourcing. While the Feasibility Study Report does not specify the exact dimensions of the borrow pit, it will be developed in a controlled manner to ensure material quality and minimise environmental disturbance. Based on the embankment volume

requirements (approximately 930,000 m³ of compacted fill, as per the FSR cost estimate), the borrow pit area is expected to be of sufficient size to meet the project's material needs

1.2.3 Design Capacity and Footprint

The combined Tailings Storage Facility G-1 is designed with a total storage capacity of 5.48 million m³ (effective capacity 4.76 million m³). The facility comprises the existing Pond G (area ~130,000 m², capacity 1.836 million m³) and a western extension area where new embankments will be constructed on the north, west, and south sides. The internal shared embankment on the west, north, and south sides of Pond G will be demolished to create a single, integrated pond. The maximum dam height is 22.5 m, and the facility is classified as a Class IV tailings pond.

1.2.4 Embankment Design

The embankment will be constructed as a rolled earth-rock dam using locally sourced silty clay (from within the pond area and from demolition of existing dams). The fill will be placed in lifts (typical 200–300 mm) and compacted to at least 96% of standard Proctor maximum density. The dam crest elevation is 1340 m with a crest width of 5 m. A 5 m wide berm is provided at elevation 1325 m on the outer slope. Inner slope ratio is 1:2.5; outer slope ratios are 1:2.5 for north and west dams and 1:2.75 for the south dam. An independent geotechnical engineer will certify the design, with minimum factors of safety meeting GB39496-2020 requirements for Class IV ponds.

1.2.5 Lining System (Anti-Seepage)

The entire pond area (both existing Pond G and the western extension) will be equipped with a 1.5 mm thick HDPE composite geomembrane anti-seepage layer. The geomembrane will be laid over the prepared subgrade and anchored at the dam crest and the 1330 m inner slope platform. The existing geomembrane from the demolished emergency pools may be reused after quality inspection. This single-layer HDPE system effectively prevents seepage of tailings liquor into the foundation, protecting underlying groundwater.

1.2.6 Leak Detection and Underdrainage System

The HDPE geomembrane lining system is designed as the primary barrier against seepage. To manage any potential minor seepage that may bypass the liner through construction defects or damage, drainage blind ditches are provided at 50 m intervals at the dam bottom, connected to a drainage prism at the outer toe (2 m height above ground, 1 m buried, slope 1:1.5, top width 1.5 m). Any seepage water that reaches the drainage system is collected in the toe drainage ditch and can be pumped back to the plant if necessary. No automated alarm sump is required; manual inspection of drainage outfalls and the toe ditch is performed regularly. Routine visual inspections and groundwater monitoring (3 wells) provide additional assurance of liner integrity.

1.2.7 Water Management System

During the normal production of the tailings pond, the tailings water in the pond is not discharged externally. It is pumped to the plant area for reuse through the water pump in the pond, and the water level in the pond is controlled. A spillway-type flood discharge system is provided at the top

of the south dam and is composed of an overflow weir at the dam crest, a steep chute on the dam slope, a stilling basin at the dam toe, and a drainage ditch downstream. The drainage ditch finally leads to the existing downstream 7 silt traps and 3 Pollution Control Dam (PCD) drainage ditch. The above-mentioned flood discharge facilities are all of C30 reinforced concrete cast-in-situ structure. With a bottom elevation of 1338m at the dam crest, the overflow weir is a box - culvert structure with a rectangular cross-section and a net size of 2.0m (width) $\times$ 1.0m (height); the net cross-section size of the steep chute is 1.0m (width) $\times$ 1.0m (depth); the net cross-section size of the stilling basin is 5.0m (length) $\times$ 2.0m (width) $\times$ 1.5m (depth); the net cross-section size of the drainage ditch is 1.0m (width) $\times$ 1.0m (depth).

1.2.8 Monitoring Programme

The tailings pond will be equipped with manual safety monitoring facilities as follows:

- Dam surface displacement: 8 observation points
- Seepage line (piezometers): 8 observation points
- Pond water level: 1 observation point

Monitoring frequency: daily visual inspections during operation; displacement and seepage readings taken weekly during construction and monthly thereafter. Groundwater monitoring: 3 wells located at the outer toe of the north, west, and south dams, sampled quarterly for heavy metals and physico-chemical parameters. Results are reported to ZEMA and the Ministry of Mines every six months. An online safety monitoring system may be added separately.

1.3 Rationale

The proposed TSF extension (combining the existing Pond G with a new western extension to form Tailings Storage Facility G-1) serves a twofold rationale: first, to protect immediate environmental components – particularly groundwater resources and surrounding soil – from contamination through the installation of a 1.5 mm HDPE composite geomembrane anti-seepage layer and a sub-membrane drainage system, thereby enhancing long-term sustainability; second, to foster responsible economic development by ensuring uninterrupted tailings management capacity for the leaching plant to store tailings from the remaining approximately 6 million tonnes of ore, enabling continued copper processing and value addition while creating approximately 150 construction jobs and 5 permanent positions.

1.4 Project Alternatives

Alternative Category	Options Considered	Choice and Rationale
No Project Option	Option 1: Not develop the western extension and rely solely on existing Pond G (1.836 million m³, currently operational). Option 2: Decommission the leaching plant entirely.	Chosen: Western extension to form combined TSF G-1. Rationale: Without additional capacity, Pond G would be unable to store tailings from the remaining ~6 million tonnes of ore, forcing plant shutdown, loss of 100+ jobs, and cessation of public revenue. Decommissioning the plant is economically and socially unacceptable. The extension is necessary.
TSF Location / Siting	Option 1: Western extension directly adjacent to existing Pond G (west side, demolishing internal dams). Option 2: Locate a new standalone TSF on greenfield land.	Chosen: Western extension adjacent to Pond G. Rationale: Adjacent location allows integration with existing Pond G by demolishing internal embankments, sharing infrastructure (access roads, duty rooms), and reducing land disturbance. A distant greenfield site would require new pipelines, roads, and security – increasing cost, environmental footprint, and risk of community opposition.
Tailings Transport	Option 1: Dedicated HDPE pipeline from leaching plant to TSF. Option 2: Truck transport using covered dump trucks.	Chosen: Pipeline. Rationale: Pipeline eliminates road traffic, spillage risks, dust, noise, and road. Pipeline is industry best practice. Truck transport would require many truckloads per day, causing unacceptable community disruption and safety hazards.
Lining System	Option 1: 1.5 mm HDPE composite geomembrane (as per FSR).	Chosen: 1.5 mm HDPE composite geomembrane (Option 1). Rationale: The 1.5 mm HDPE geomembrane as the anti-seepage layer is proven effective, cost-efficient, and meets local regulatory requirements. Adding clay or GCL layers would increase cost without significant benefit given the site's existing

	Option 2: Thicker HDPE (2.0 mm) with additional clay/GCL layers. Option 3: No liner (raw earth).	geological conditions. No liner is illegal and would guarantee groundwater contamination.
Water Management	Option 1: Process will be recycled to the plant. Option 2: Construct new settling ponds.	Chosen: Recycle water to the plant (Option 1).
Tailings Deposition Method	Option 1: Dispersed alternate discharge via main PE pipe along dam crest with branch pipes every 10–30 m. Option 2: Single-point discharge.	Chosen: Dispersed alternate discharge. Rationale: This method ensures even rise of the sedimentation beach, promotes drying and consolidation, and maximises storage capacity. Single-point discharge would create uneven beach slopes and may lead to local saturation near the dam.
TSF Design Type	Option 1: Flat-type (raised embankment on four sides) – as per existing Pond G and extension. Option 2: Valley-type (impoundment against natural topography).	Chosen: Flat-type (raised embankment). Rationale: The site is relatively flat, making a valley-type impoundment unsuitable. The flat-type design with dams built at one time is consistent with existing Pond G, operationally simple, and cost-effective.
Monitoring Approach	Option 1: Manual monitoring (8 displacement points, 8 seepage points, 1 water level, 3 video cameras) Option 2: Fully automated online monitoring with vibrating	Chosen: Online monitoring (Option 2). Rationale: The online monitoring is already in use at TD15G and will be extended to TD15G-1.

	wire piezometers and real-time alarms.	
Closure and Rehabilitation	Option 1: Capping with loam and grass planting. Option 2: Multi-layer cap (clay + geomembrane + topsoil). Option 3: No capping (leave tailings exposed).	Chosen: Loam cap with grass planting (Option 1). Rationale: Covering with loam and establishing vegetation is sufficient to control dust and erosion. A multi-layer cap would add unnecessary cost. No capping is illegal and would cause environmental harm.
Community Engagement	Option 1: Minimum statutory public hearing. Option 2: Proactive ongoing engagement, local liaison committee, and independent grievance mechanism.	Chosen: Proactive engagement (Option 2). Rationale: The company will continue with monthly community meetings, a dedicated liaison officer, and an independent grievance process – essential for social license to operate.

1.5 Main Objectives:

To construct and operate the combined Tailings Storage Facility as a fully engineered tailings management facility that adequately contains tailings from the leach plant, safeguards groundwater and soil resources through a 1.5 mm HDPE composite geomembrane anti-seepage layer , and protects public health in the surrounding host community.

Specific Objectives

- To sustainably operate the leach plant with integrated tailings management.
- To provide ZEMA, the Ministry of Mines, and relevant stakeholders with a comprehensive environmental and social assessment as a basis for granting final ESIA approval.
- To create approximately 150 construction jobs and 5 permanent operational positions for qualified individuals from the host community of Kalulushi District.
- To generate public revenue through continued copper production, including taxes, royalties, and local levies that support district and national development.

1.6 Capital Investment

The proposed project is estimated to have an investment cost of US\$7.5162 million.

1.7 Proposed implementation date

The project developer wishes to implement the proposed project as soon as the EIA process is completed and approved by ZEMA. It is anticipated that the project shall start by 30th September 2026.

Table 3: Project Schedule

Activity	2026	2027	2038
Site Preparation	August		
Mobilization of equipment	September		
Construction of new rolled earth-rock embankments	September		
Installation of sub-membrane drainage layer	October		
Installation of groundwater monitoring facilities	October		
Operation	November	(10 years)	
Decommissioning			2 years

1.8 Brief description of the Location

The proposed project site is located in Chambishi area of Kalulushi district, Copperbelt Province. The Kalulushi Central Business District (CBD) is located about 22Km South of the proposed project site. The proposed site of the TD15G-1 is located on the west side of TD15G. To the

immediate east of TD15G, there is pond F. There is an external access road about 200m to the north and 150 m- 550 m to the west of TD15G. Other nearby landmarks include the Chingola-Kitwe Road located about 500m, Eco Petroleum Filling Station located about 2.12Km North East of the project site, Cosak Substation CEC located about 1.95Km North East of the proposed project site, Chambishi Metals located about 1.39Km east of the proposed project site, and JCHX Mining Limited located about 3.21Km South East of the proposed project site.

Table 4 site corner coordinates

Point No.	Longitude (°)	Latitude (°)
G1	28.02719142	-12.63920904
G2	28.02726446	-12.63887517
G3	28.02479501	-12.63768680
G4	28.02308843	-12.63686554
G5	28.02236308	-12.63693373
G6	28.02210581	-12.63735971
G7	28.02156786	-12.64077567
G8	28.02096347	-12.64497071
G9	28.02366686	-12.64512404
G10	28.02583740	-12.64522136
G11	28.02635648	-12.64529147
G12	28.02672526	-12.64545359

1.9 Contact Details

NAME	Martin Amukusana
DESIGNATION	Assistant Chief Executive Officer
CELL PHONE	+260979724889
Postal Address	P O Box 22880, Kitwe
Physical Address	Chambishi Mine Area

1.10 Particulars of shareholders

Table 5 Shares

Name	Nationality	Shares	Share class
China Nonferrous Metal Mining (Group) Co., Ltd.	Chinese Firm	55%	Ordinary
China Hainan Sino Africa Mining Investment Company Limited	Chinese Firm	30%	Ordinary
NFC Africa Mining Plc.	Zambian Firm	15%	Ordinary

Table 6 Directors

Name	Rank	Address	Nationality
WenDong Tian	Director	Sino Metals China House, Ganerton	Chinese
Xu Weimin	Director	Sino Metals China House, Ganerton	Chinese
Jingjun Wang	Director	Sino Metals China House, Ganerton	Chinese
XianYuan Li	Director	NFCA Green Home Farm China House, Kitwe-Chingola Road	Chinese
Yi Xi	Director	Sino Metals China House, Ganerton	Chinese
Yang Ligang	Director	NFCA Green Home Farm China House, Kitwe-Chingola Road	Chinese
Zhang Junxuan	Director	Sino Metals China House, Ganerton	Chinese

1.11 Track Record

Sino-Metals Leach Zambia Limited is a Zambian-incorporated company under PACRA and a subsidiary of China Nonferrous Metal Mining (Group) Co., Ltd. (CNMC). Sino-Metals Zambia Limited (Sino-Metals, or SMZL) was established in 2004 with the objective of producing copper cathodes from low-grade copper oxide ore stockpiles and copper oxide tailings dams left behind by the previous mine operators, the Zambia Consolidated Copper Mines (ZCCM) Limited. The company operates a copper concentrator and hydrometallurgical complex in Chambishi, Kalulushi District, Copperbelt Province. The processing facilities for Sino-Metals were set up within the mine license of NFCA Mining Corporation Plc in the Chambishi area of Kalulushi District. The company has experience in managing TSFs and metallurgical operations; a record of complying with ZEMA requirements for EIAs/EPBs; and a corporate responsibility program focused on community support and environmental compliance.

2. LEGAL AND POLICY FRAMEWORK

This section presents social, environmental and other regulatory institutional laws that shall apply to the proposed project.

2.1 Historical background of the Environmental Legal and Policy Framework in Zambia

Due to the need for balancing environmental requirements, economic activities and social needs, the Government of the Republic of Zambia (GRZ) adopted the National Conservation Strategy (NCS) in 1985. This was upgraded to the National Environmental Action Plan (NEAP) in 1992 with the same aim of fostering sustainable development. The NCS and NEAP are the foundation pillars of environmental laws in Zambia. The NCS facilitated development of the Environmental Protection and Pollution Control Act (EPPCA) which was enforced in 1990. This Act consequently facilitated formulation of the Environmental Council of Zambia (ECZ) in 1992. The EPPCA was repealed in 2011 into the Environmental Management Act No. 12 of 2011, which is the current supreme environmental management law. Through provisions of this Act, ECZ was changed to Zambia Environmental Management Agency (ZEMA).

2.2 Legislative Framework Applicable to the Proposed Project

The following table outlines the key legislation applicable to the proposed project, detailing its relevance and how the project will ensure compliance.

2.3 Local Regulations

Act / Statutory Instrument	Relevance to the Proposed TSF Extension	Compliance by Sino-Metals Leach Zambia Limited
The Environmental Management Act No. 12 of 2011	This is the principal Act for environmental protection in Zambia. It provides the legal basis for the ESIA process, pollution control, and waste management, all of which are central to the proposed TSF extension (embankment construction, HDPE lining, spillway construction, water management).	The company is conducting a full ESIA, as mandated by this Act, and will obtain all necessary permits (e.g., for air emissions, waste management, water discharges) from ZEMA before commencing construction and operation.
Environmental Management (Environmental Impact Assessment) Regulations, S.I. No. 3 of 2026	These regulations require a full Environmental and Social Impact Statement (ESIS) for tailings storage facilities. The proposed extension falls under Class IV/V of the First Schedule, as the combined facility covers approximately 47 hectares.	The company has prepared and submitted a Scoping Report and Terms of Reference, and will submit a comprehensive ESIS in full compliance with these regulations. The process has included a scoping meeting (15th May 2026 at the site premises), public consultation, and will include disclosure of the draft ESIS.
Environmental Management (Licensing) Regulations, S.I. No. 112 of 2013 –	Regulates emissions to air and discharges to water. Construction activities (earthworks, vehicle movements, demolition) will generate	Dust suppression measures (water bowsers, speed limits) will be implemented during construction. The TSF will be lined with 1.5 mm HDPE geomembrane to prevent

Part II (Air and Water Pollution)	dust and gaseous emissions. Water management (zero discharge under normal operations, spillway for floods) has implications for water quality.	seepage. Groundwater monitoring (3 wells) will be conducted quarterly. No untreated water will be discharged to watercourses.
Environmental Management (Licensing) Regulations, S.I. No. 112 of 2013 – Part IV (Hazardous Waste Management)	Governs the management of hazardous waste. The project will generate used oil, oily rags, empty lubricant containers, and potentially contaminated HDPE offcuts from lining installation and machinery servicing.	All hazardous waste will be stored in designated, impermeable, bunded drums within the site. Used oil will be collected by a ZEMA-licensed hazardous waste contractor for recycling or proper disposal. Contaminated HDPE offcuts will be managed under SI No. 112 Part IV. Spill kits will be maintained at all fuel handling and machinery areas.
Minerals Regulation Commission Act (MRCA) No. 14 of 2024	Repeals and replaces the Mines and Minerals Development Act No. 11 of 2015; establishes the Minerals Regulation Commission. The Act mandates safety, health, and environmental protection in mining operations, including tailings storage facilities.	The TSF extension will be operated under the terms of the mining lease (Chambishi Mine License Area). All construction, operation, and closure activities will comply with MRCA requirements, including tailings facility design, monitoring, and closure standards.
Mines and Minerals (Environmental)	These regulations provide a framework for environmental impact assessments for mining-related projects, including	The ESIS being prepared addresses all environmental impacts and mitigation measures for the TSF extension.

Regulations, S.I. No. 29 of 1997	mine waste dumps. They require compliance with air, water, and hazardous materials standards, and the Environmental Protection Fund.	Environmental audits will be conducted as required, and the Minerals Regulation Commission (MRC) will be consulted throughout the project. The company will contribute to the Environmental Protection Fund as required.
Mines and Minerals (Environmental Protection Fund) Regulations, S.I. No. 102 of 1998	Establishes a fund to support environmental rehabilitation if a developer fails to comply with the approved EMP.	The company will make periodic contributions to the Environmental Protection Fund in accordance with the prescribed rates to cover the future rehabilitation obligations of the TSF.
Water Resources Management Act No. 21 of 2011	Establishes WARMA and regulates the use, conservation, and management of water resources. The TSF extension must prevent contamination of surface water (Chambishi stream, Lulamba stream, Mwambashi River) and groundwater.	The TSF will be lined with 1.5 mm HDPE geomembrane with blind ditches and a drainage prism to prevent seepage. Three groundwater monitoring wells will be installed (north, west, south outer toes) and sampled quarterly. Zero discharge under normal operations. The company will obtain any required water abstraction permits from WARMA.
Public Health Act, Cap 295	Relates to the prevention of diseases and public health hazards. Construction and operation may generate dust, noise, and waste, which could affect public health.	Dust suppression measures will be implemented. The site will be fenced to prevent public access. Waste will be segregated and disposed of at Kalulushi

		Municipal Council designated landfill. Workers will be sensitized on hygiene practices. Malaria prevention measures will be provided where necessary.
Occupational Health and Safety Act No. 16 of 2025	Mandates the health and safety of persons at work. Construction involves risks from earthworks, heavy machinery, demolition, HDPE liner installation, and working at heights (embankments).	A site-specific Health and Safety Plan will be implemented. All workers will receive safety inductions and daily toolbox talks. Appropriate PPE (hard hats, safety boots, hi-vis clothing, dust masks, hearing protection) will be provided. First aid kits and emergency response equipment will be maintained on site.
Employment Code Act No. 3 of 2019	Regulates all aspects of employment, including contracts, wages, and prohibits discrimination. The project will employ approximately 150 construction workers and 5 permanent staff.	The company will establish fair, non-discriminatory employment policies, giving priority to local community members from Kalulushi District where qualified. Written contracts will be provided, and all legal requirements regarding wages, working hours, and conditions will be adhered to.
Local Government Act No. 2 of 2019	Empowers local authorities like Kalulushi Municipal Council. The project is located within the Council's jurisdiction and requires its approvals	The company will engage with Kalulushi Municipal Council, obtain necessary planning permissions, site plan approvals,

	for development plans and construction permits.	and building permits before commencing construction.
Lands Act Cap. 184 (as amended by Act No. 20 of 2015)	Governs the administration of state land, leases, and prohibition of unauthorised occupation. The project site is state land held under a lease agreement by Sino-Metals.	The company holds a valid lease for the site and will not encroach on adjoining land. The company will engage with Kalulushi Municipal Council on any land-use matters.
Urban and Regional Planning Act No. 3 of 2015	Provides for development planning and land-use control. The extension site is currently wasteland; change of use to industrial (TSF) requires planning permission.	The company will submit site plans and obtain planning permission from Kalulushi Municipal Council before construction.
National Heritage Conservation Act, Cap 173	Protects sites and objects of archaeological, historical, or cultural significance. Ground-disturbing activities (earthworks, excavation for embankments, spillway, monitoring wells) could potentially unearth such finds.	The company will implement a “Chance Find Procedure.” If any potential heritage objects are discovered during construction, all activities in the immediate area will cease, and the National Heritage Conservation Commission (NHCC) will be informed within 14 days.
Forestry Act No. 4 of 2015	Provides for the conservation and protection of forests and trees. Site clearing for the western extension and embankments may involve removal of vegetation.	A pre-clearance walk-through survey will be conducted to identify any protected tree species. Clearing will avoid these trees where possible. The area is largely wasteland with minimal vegetation, so

		large-scale clearing is not anticipated. Any necessary permits will be obtained from the Forestry Department.
Fisheries Act No. 22 of 2011	Protects fish and aquatic ecosystems. Runoff or sedimentation could affect Chambishi and Lulamba streams, which contain fish species.	Zero discharge will be maintained; water quality monitoring will be conducted quarterly. The company will consult the Department of Fisheries if needed. Diversion ditches will prevent sediment-laden runoff from entering watercourses.
Solid Waste Management Act No. 20 of 2018	Provides for the management of solid waste, including segregation, storage, and disposal. Construction and operation will generate domestic waste and construction debris.	Waste will be segregated at source (hazardous vs non-hazardous). Non-hazardous waste will be disposed of at Kalulushi Municipal Council designated landfill. No open burning or illegal dumping will be permitted.
Public Roads Act No. 12 of 2002	Regulates the care, maintenance, and construction of public roads. The project will use existing access roads (north side road and Pond F road). Heavy construction vehicles may affect road condition.	The company will consult the Road Development Agency on access road use and ensure vehicle weights comply with legal limits.
Road Traffic Act No. 11 of 2002	Governs road safety and traffic management. The project will increase	A Traffic Management Plan will be implemented. Speed limits (maximum 20

	vehicle movements on access roads, posing risks to other road users, pedestrians, and livestock.	km/hr on gravel roads) will be enforced. Appropriate road signage will be installed. All drivers will be properly licensed and trained.
Workers' Compensation Act No. 10 of 1999	Provides compensation to workers who are injured or contract diseases during employment.	The company will register all employees with the Workers' Compensation Fund Control Board and make the necessary contributions to ensure workers are covered in case of work-related injury or illness.
Pneumoconiosis Act No. 13 of 1994	Specifically addresses the health of workers in mining environments, requiring regular medical check-ups for exposure to silica dust. Earthworks and tailings may generate silica-containing dust.	All workers exposed to dust will be provided with dust masks. Routine medical check-ups, including silicosis screening, will be conducted as required under the Act. Dust suppression measures (water spraying) will be implemented during earthworks.
Ionising Radiation Protection Act No. 16 of 2005	Protects the public, workers, and environment from hazards arising from ionising radiation. Copper tailings may contain naturally occurring radioactive materials (NORMs) at trace levels.	Baseline radiation surveys will be conducted. If any radiation hazards are identified, the Radiation Protection Authority will be notified, and appropriate measures implemented.

2.4 International Conventions

Convention	Relevance to the Proposed TSF Extension	Compliance by Sino-Metals Leach Zambia Limited
United Nations Framework Convention on Climate Change (UNFCCC)	Construction and operation will involve the use of vehicles, earthmoving machinery, pumps, and generators, leading to combustion of fossil fuels and emission of greenhouse gases (CO ₂ , NO _x). Temporary vegetation clearance may reduce carbon sequestration capacity.	The company will ensure all equipment is well maintained for fuel efficiency. The area of vegetation cleared will be strictly limited to the minimal footprint. Post-closure rehabilitation (loam capping and grass planting) will restore carbon sequestration capacity. Idling vehicles will be switched off when not in use.
Convention on Biological Diversity (CBD)	The project involves temporary clearing of vegetation for the western extension footprint, new embankments, access roads, and construction activities. The area provides potential habitat for birds and small fauna (grasshoppers, lizards, rats) but is largely wasteland with minimal vegetation, surrounded by existing industrial operations.	Clearing will be strictly limited to the demarcated footprint. Existing access roads (north side road and Pond F Road) will be used. The 7.65 km buffer from Chambishi stream and 1.75 km buffer from Lulamba stream will be maintained. Post-closure rehabilitation will use native grass species. A “No Poaching” policy will protect fauna.
Ramsar Convention on Wetlands	While the project site is not within a designated Ramsar wetland, Chambishi stream, Lulamba stream, and the Mwambashi River (part of the upper Kafue	The project will maintain zero discharge under normal operations. The 1.5 mm HDPE geomembrane liner and drainage blind ditches will prevent seepage.

	River basin) provide important wetland functions. The convention promotes wise use of all wetlands.	Diversion ditches will prevent sediment-laden runoff from entering watercourses. No discharge of untreated water will occur. Downstream water quality will be protected through quarterly groundwater monitoring (3 wells).
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes	The project will generate hazardous waste (used oil, oily rags, contaminated HDPE offcuts, empty chemical containers). The Basel Convention aims to ensure environmentally sound management of hazardous waste.	All hazardous waste will be stored, handled, and disposed of in an environmentally sound manner. It will only be transported by ZEMA-licensed Zambian contractors and disposed of at a licensed facility within Zambia, ensuring no transboundary movement. Records of hazardous waste disposal will be maintained.
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	Migratory bird species may use the Chambishi and Lulamba stream corridors and surrounding woodlands. Disturbance from noise, lighting, and habitat disturbance could impact them.	The project will minimise habitat loss by restricting the footprint. High-noise activities will be restricted to daytime hours where feasible. Lighting will be shielded to avoid spillage. Workers will be prohibited from hunting or trapping wildlife. Rehabilitation (grass planting) will restore habitat.
Kyoto Protocol to the UNFCCC	The project will emit greenhouse gases from vehicles, earthmoving machinery,	Emissions will be minimised through regular equipment maintenance, reduced

	pumps, and generators, contributing to climate change.	idling, and limiting vegetation clearance. Energy efficiency measures will be adopted where feasible.
Stockholm Convention on Persistent Organic Pollutants (POPs)	POPs are not expected to be used in the TSF extension. However, the convention requires prevention of unintended use.	The company will prohibit the use of POP-containing equipment or substances. Any POP-containing materials discovered on site will be rejected and disposed of in accordance with the Convention.
Minamata Convention on Mercury	Mercury or its compounds are not used in the hydrometallurgical process or TSF extension.	The company will prohibit the use of mercury-containing materials by contractors and suppliers.

3. Project Description

3.1 Location

The proposed project site is located in Chambishi area of Kalulushi district, Copperbelt Province. The Kalulushi Central Business District (CBD) is located about 22Km South of the proposed project site. The proposed site of the TD15G-1 is located on the west side of TD15G. To the immediate east of TD15G, there is pond F. There is an external access road about 200m to the north and 150 m- 550 m to the west of TD15G. Other nearby landmarks include the Chingola-Kitwe Road located about 500m, Eco Petroleum Filling Station located about 2.12Km North East of the project site, Cosak Substation CEC located about 1.95Km North East of the proposed project site, Chambishi Metals located about 1.39Km east of the proposed project site, and JCHX Mining Limited located about 3.21Km South East of the proposed project site.

Table 7: site corner coordinates

Point No.	Longitude (°)	Latitude (°)
G1	28.02719142	-12.63920904
G2	28.02726446	-12.63887517
G3	28.02479501	-12.63768680
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G9	28.02366686	-12.64512404
G10	28.02583740	-12.64522136
G11	28.02635648	-12.64529147
G12	28.02672526	-12.64545359

3.2 Project Description

3.2.1 Tailings Delivery System

Tailings from the existing leaching plant will be pumped via a dedicated HDPE pipeline (approximately 0.225 m diameter) to the proposed combined Tailings Storage Facility G-2 (existing Pond G plus western extension). The slurry will be discharged at a solids content of

approximately 50%, which is thick enough to minimise free water yet sufficiently fluid for reliable pumping without settling. The pipeline will be supported on concrete piers as required, with manual shut-off valves, and inspected daily. This method eliminates road transport of tailings, avoiding traffic disruptions, road damage, and spillage risks.

3.2.2 Embankment Material Sourcing and Borrow Pit

The borrow pit for the embankment construction will be located within the mine lease area. The silty clay material will be excavated from this designated pit to supply the required fill for the rolled earth-rock dam. The pit is not intended to modify the specified TSF footprint or storage capacity; its sole purpose is material sourcing. While the Feasibility Study Report does not specify the exact dimensions of the borrow pit, it will be developed in a controlled manner to ensure material quality and minimise environmental disturbance. Based on the embankment volume requirements (approximately 930,000 m³ of compacted fill, as per the FSR cost estimate), the borrow pit area is expected to be of sufficient size to meet the project's material needs.

3.2.3 Design Capacity and Footprint

The combined Tailings Storage Facility G-2 is designed with a total storage capacity of 5.48 million m³ (effective capacity 4.76 million m³). The facility comprises the existing Pond G (area ~130,000 m², capacity 1.836 million m³) and a western extension area where new dams will be constructed on the north, west, and south sides. The internal shared dams on the west, north, and south sides of Pond G will be demolished to create a single, integrated pond. The maximum dam height is 22.5 m, and the facility is classified as a Class IV tailings pond.

3.2.4 Embankment Design

The embankment will be constructed as a rolled earth-rock dam using locally sourced silty clay (from within the pond area and from demolition of existing dams). The fill will be placed in lifts (typical 200–300 mm) and compacted to at least 96% of standard Proctor maximum density. The dam crest elevation is 1340 m with a crest width of 5 m. A 5 m wide berm is provided at elevation 1325 m on the outer slope. Inner slope ratio is 1:2.5; outer slope ratios are 1:2.5 for north and west dams and 1:2.75 for the south dam. An independent geotechnical engineer will certify the design, with minimum factors of safety meeting GB39496-2020 requirements for Class IV ponds.

3.2.5 Lining System (Anti-Seepage)

The entire pond area (both existing Pond G and the western extension) will be equipped with a 1.5 mm thick HDPE composite geomembrane anti-seepage layer. The geomembrane will be laid over the prepared subgrade and anchored at the dam crest and the 1330 m inner slope platform. The existing geomembrane from the demolished emergency pools may be reused after quality inspection. This single-layer HDPE system effectively prevents seepage of tailings liquor into the foundation, protecting underlying groundwater.

3.2.6 Leak Detection and Underdrainage System

The HDPE geomembrane lining system is designed as the primary barrier against seepage. To manage any potential minor seepage that may bypass the liner through construction defects or damage, drainage blind ditches are provided at 50 m intervals at the dam bottom, connected to a drainage prism at the outer toe (2 m height above ground, 1 m buried, slope 1:1.5, top width 1.5 m). Any seepage water that reaches the drainage system is collected in the toe drainage ditch and can be pumped back to the plant if necessary. No automated alarm sump is required; manual inspection of drainage outfalls and the toe ditch is performed regularly. Routine visual inspections and groundwater monitoring (3 wells) provide additional assurance of liner integrity.

3.2.7 Water Management System

During the normal production of the tailings pond, the tailings water in the pond is not discharged externally. It is pumped to the plant area for reuse through the water pump in the pond, and the water level in the pond is controlled. A spillway-type flood discharge system is provided at the top of the south dam and is composed of an overflow weir at the dam crest, a steep chute on the dam slope, a stilling basin at the dam toe, and a drainage ditch downstream. The drainage ditch finally leads to the existing downstream 7 silt traps and 3 Pollution Control Dam (PCD). The above-mentioned flood discharge facilities are all of C30 reinforced concrete cast-in-situ structure. With a bottom elevation of 1338m at the dam crest, the overflow weir is a box - culvert structure with a rectangular cross-section and a net size of 2.0m (width) $\times$ 1.0m (height); the net cross-section size of the steep chute is 1.0m (width) $\times$ 1.0m (depth); the net cross-section size of the stilling basin is 5.0m (length) $\times$ 2.0m (width) $\times$ 1.5m (depth); the net cross-section size of the drainage ditch is 1.0m (width) $\times$ 1.0m (depth).

3.2.8 Monitoring Programme

The tailings pond will be equipped with manual safety monitoring facilities as follows:

- Dam surface displacement: 8 observation points
- Seepage line (piezometers): 8 observation points
- Pond water level: 1 observation point

Monitoring frequency: daily visual inspections during operation; displacement and seepage readings taken weekly during construction and monthly thereafter. Groundwater monitoring: 3 wells located at the outer toe of the north, west, and south dams, sampled quarterly for heavy metals and physico-chemical parameters. Results are reported to ZEMA and the Ministry of Mines every six months. An online safety monitoring system may be added separately.

3.3 Project Schedule and lifespan of the project

The lifespan of the project is expected to be 10 years

Table 8: Project Schedule

Activity	2026	2027	2038
Site Preparation	August		
Mobilization of equipment	September		
Construction of new rolled earth-rock embankments	September		
Installation of sub-membrane drainage layer	October		
Installation of groundwater monitoring facilities	October		
Operation	November	(10 years)	
Decommissioning			2 years

4. MAIN ACTIVITIES OF THE PROJECT

4.1 Site preparation

This stage shall involve clearing and grubbing of the western extension area (west side of existing Pond G) and the footprint for new dam embankments on the north, west, and south sides. Activities include removal of any residual vegetation, topsoil stripping for later use in closure, and establishment of site access from the existing north access road. Site preparation will be conducted under strict dust suppression measures.

4.2 Construction phase

The construction phase shall involve earthworks, demolition, and installation of all components for the combined Tailings Storage Facility G-1 (existing Pond G plus western extension), including:

- Demolition of internal shared dams on the west, north, and south sides of existing Pond G to combine with the extension.
- Embankment construction – rolled earth-rock dam, maximum height 22.5 m, crest elevation 1340 m, crest width 5 m, inner slope 1:2.5, outer slopes 1:2.5 (north/west) and 1:2.75 (south). Compaction $\geq 96\%$ of standard Proctor density.
- Laying of 1.5 mm HDPE composite geomembrane over the entire pond area (existing Pond G and western extension) as the anti-seepage layer.
- Drainage prism and blind ditches – drainage prism at the outer toe (2 m high, 1:1.5 slopes, top width 1.5 m) and drainage blind ditches every 50 m at the dam bottom.
- Perimeter road construction – dam crest road (5 m wide) and berm road (5 m wide at elevation 1325 m), connected to the existing north access road and Pond F Road.
- Groundwater monitoring wells installation – 3 wells (depth 15–25 m) located at the outer toe of the north, west, and south dams.
- Manual monitoring facilities – 8 displacement observation points, 8 seepage line observation points (piezometers), 1 pond water level observation point.

4.3 Operation phase

The operation phase shall involve tailings delivery from the leaching plant to the combined TSF G-2 via pipeline, and the subsequent management of stormwater, decanting, and monitoring:

- **Pumping tailings to TSF 15G-1** – slurry at 50% solids, approximately 37,500 m³/month (based on 865,300 tonnes of tailings sand per year).
- **Tailings discharge** – via main PE pipe along the dam crest and branch pipes, using dispersed and alternate discharge to ensure even rise of the sedimentation beach. During the final operation stage, maintain a distance of at least 100 m from the spillway.
- **Routine monitoring of TSF integrity** – daily visual inspections; weekly/monthly readings of displacement, seepage line, and water level; continuous video surveillance.

- **Routine groundwater monitoring** – quarterly sampling from 3 monitoring wells (north, west, south outer toes), analysing for heavy metals and physico-chemical parameters, with reports to ZEMA and the Ministry of Mines every six months.

4.4 Closure phase

The closure phase will involve the permanent closure of the combined TSF G-2 by capping and revegetation of the tailings surface, integrated with the eventual closure of any remaining facilities:

- **Capping** – covering the tailings surface with loam and soil (no geomembrane cap required).
- **Vegetation** – planting of grass and native species to control erosion and suppress dust.
- **Maintaining perimeter fence** – keeping the 2.4 m high chain-link fence with razor wire and warning signs to prevent public access.
- **Post-closure monitoring** – monitoring of groundwater quality (3 wells), cap integrity, settlement, and vegetation health for at least 5 years after closure, with regular reporting to ZEMA.
- **Continued maintenance** – inspection and repair of drainage structures as needed.

5. Project Alternatives

Alternative Category	Options Considered	Choice and Rationale
No Project Option	Option 1: Not develop the western extension and rely solely on existing Pond G (1.836 million m³, currently operational). Option 2: Decommission the leaching plant entirely.	Chosen: Western extension to form combined TSF G-1. Rationale: Without additional capacity, Pond G would be unable to store tailings from the remaining ~6 million tonnes of ore, forcing plant shutdown, loss of 100+ jobs, and cessation of public revenue. Decommissioning the plant is economically and socially unacceptable. The extension is necessary.
TSF Location / Siting	Option 1: Western extension directly adjacent to existing Pond G (west side, demolishing internal dams). Option 2: Locate a new standalone TSF on greenfield land.	Chosen: Western extension adjacent to Pond G. Rationale: Adjacent location allows integration with existing Pond G by demolishing internal dams, sharing infrastructure (access roads, duty rooms), and reducing land disturbance. A distant greenfield site would require new pipelines, roads, and security – increasing cost, environmental footprint, and risk of community opposition.
Tailings Transport	Option 1: Dedicated HDPE pipeline from leaching plant to TSF. Option 2: Truck transport using covered dump trucks.	Chosen: Pipeline. Rationale: Pipeline eliminates road traffic, spillage risks, dust, noise, and road. Pipeline is industry best practice. Truck transport would require many truckloads per day, causing unacceptable community disruption and safety hazards.
Lining System	Option 1: 1.5 mm HDPE composite geomembrane (as per FSR).	Chosen: 1.5 mm HDPE composite geomembrane (Option 1). Rationale: The 1.5 mm HDPE geomembrane as the anti-seepage layer is proven effective, cost-efficient, and meets local regulatory requirements. Adding clay or

	Option 2: Thicker HDPE (2.0 mm) with additional clay/GCL layers. Option 3: No liner (raw earth).	GCL layers would increase cost without significant benefit given the site's existing geological conditions. No liner is illegal and would guarantee groundwater contamination.
Water Management	Option 1: A spillway-type flood discharge system is provided at the top of the south dam and is composed of an overflow weir at the dam crest, a steep chute on the dam slope, a stilling basin at the dam toe, and a drainage ditch downstream. . Option 2: Construct new settling ponds.	Chosen: spillway-type flood discharge system (Option 1). Rationale: The drainage ditch finally leads to the existing downstream 7 silt traps and 3 Pollution Control Dam (PCD) drainage ditch.
Tailings Deposition Method	Option 1: Dispersed alternate discharge via main PE pipe along dam crest with branch pipes every 10–30 m. Option 2: Single-point discharge.	Chosen: Dispersed alternate discharge. Rationale: This method ensures even rise of the sedimentation beach, promotes drying and consolidation, and maximises storage capacity. Single-point discharge would create uneven beach slopes and may lead to local saturation near the dam.
TSF Design Type	Option 1: Flat-type (raised embankment on four sides) – as per existing Pond G and extension. Option 2: Valley-type (impoundment against natural topography).	Chosen: Flat-type (raised embankment). Rationale: The site is relatively flat, making a valley-type impoundment unsuitable. The flat-type design with dams built at one time is consistent with existing Pond G, operationally simple, and cost-effective.

Monitoring Approach	Option 1: Manual monitoring (8 displacement points, 8 seepage points, 1 water level, 3 video cameras) Option 2: Fully automated online monitoring with vibrating wire piezometers and real-time alarms.	Chosen: Manual monitoring (Option 1). Rationale: The manual monitoring is sufficient for a Class IV tailings pond, with daily visual inspections and weekly/monthly instrument readings. This meets regulatory requirements.
Closure and Rehabilitation	Option 1: Capping with loam and grass planting. Option 2: Multi-layer cap (clay + geomembrane + topsoil). Option 3: No capping (leave tailings exposed).	Chosen: Loam cap with grass planting (Option 1). Rationale: Covering with loam and establishing vegetation is sufficient to control dust and erosion. A multi-layer cap would add unnecessary cost. No capping is illegal and would cause environmental harm.
Community Engagement	Option 1: Minimum statutory public hearing. Option 2: Proactive ongoing engagement, local liaison committee, and independent grievance mechanism.	Chosen: Proactive engagement (Option 2). Rationale: The company will continue with monthly community meetings, a dedicated liaison officer, and an independent grievance process – essential for social license to operate.

6. ENVIRONMENTAL BASELINE STUDY

6.1 Climatic conditions

The project site is situated in **Agro-Ecological Zone III**, characterized by high annual rainfall and a subtropical climate. The year is divided into three distinct seasons: the cool-dry season (May–July), the hot-dry season (August–October), and the warm-humid rainy season (November–April). Average annual rainfall is approximately **1181 mm**, with the majority falling between November and March. Typical rainfall processes are mostly showers of 10-40 mm, with maximum monthly rainfall of 569.5 mm.

Table 9 Climatic Conditions

Parameter	Statistical Value	Description / Seasonality
Mean Annual Rainfall	~1,181 mm	Peak rainfall occurs December–March
Average Temperature	19.9°C – 21°C	Mean annual temperature across all seasons
Max Temperature (Hot)	22°C – 35°C (up to 37°C extreme)	Occurs in October (hottest month)
Min Temperature (Cool)	8°C – 27°C	Occurs in July (coolest month); occasional frost
Relative Humidity	59% – 81%	Lower during dry season; higher during wet season
Prevailing Wind Direction	Northeast to East	Primary direction (FSR Section 2.3)
Mean Wind Speed	~10 km/h (2.9 m/s)	Annual mean
Annual Evaporation	48 – 295 mm (mean 170.5 mm/year)	Potential evapotranspiration varies seasonally

6.2 Precipitation and Evaporation

Rainfall occurs mainly from October to April, with the majority falling between December and March. The 84-year average precipitation for a 24-hour event has been recorded at 28.6 cm in January, with the lowest being 0.2 cm in September. Evaporation for the region ranges from 48 mm to 295 mm, with an average of 170.5 mm per year.

6.3 Air Quality

The proposed project site is in a mining and industrial area, characterized by copper processing companies such as Chambishi Metals and NFCA, and other heavy industries. The air quality is largely influenced by industrial activities and vehicular activity along the nearby Chingola-Kitwe Road.

From the air quality monitoring conducted at the site, the following measurements were taken:

Table 10 Air Quality Monitoring Results

Locat ion	Coordi nates	Elevat ion (m)	PM_{2.5} (µg/ m³)	PM₁₀ (µg/ m³)	CO₂ (pp m)	Temper ature (°C)	Humi dity (%)	Noi se – Mi n (dB A)	Noi se – Ma x (dB A)	Rema rks
Point A	- 12.6429 5 / 28.0248 8	1344	24.7	35.1	399	21	48	52.2	64.4	Mode rate
Point B	- 12.6470 2 / 28.0239 8	1132	22.3	33.8	466	22	45	47.3	51.5	Good
Point C	- 12.6450 0 / 28.0264 4	1304	27.2	40.0	452	–	–	52.3	65.0	Mode rate
Point D	- 12.6420 3 / 28.0262 3	1334	29.7	36.9	–	–	–	42.7	54.4	Mode rate

Note: All measured parameters fall within ZEMA statutory limits for ambient air quality in industrial areas. PM_{2.5} and PM₁₀ levels indicate moderate air quality, typical of an active mining and industrial zone.

6.4 Noise Environment

The current sources of noise at the project site arise mainly from surrounding heavy industries within the site vicinity. Baseline noise measurements indicate ambient noise levels ranging from **42.7 dBA to 65.0 dBA**, depending on proximity to industrial operations and vehicle traffic along the Chingola-Kitwe Road. The lower readings (42.7–52.3 dBA) were recorded at

points further from active industrial sources, while the higher readings (64.4–65.0 dBA) were recorded near the access road and industrial facilities. The general industrial noise levels at the site have an average level of approximately **55 dB**, which is within typical ranges for an industrial area.

6.5 Topography

The proposed site is relatively flat and slopes gently towards the southern direction. The existing tailings pond (TD15G) is located at an altitude of **1286–1342 m**, with the terrain higher in the north and lower in the south. The western extension area (proposed site) has elevations of **1316–1333 m**, also higher in the north and lower in the south. Monitoring point elevations ranged from **1132 m** (Point B, lower-lying area) to **1344 m** (Point A, higher ground). The area occurs about 1255 m above sea level in the broader region.

6.6 Soils

The site has soil typical of the Copperbelt Province: red lateritic soils, sandy topsoils overlying more loamy clayey subsoil. These soils are susceptible to erosion by rainwater if soil conservation practices are not used. Because of high rainfall (Agro-Ecological Zone III), the soils are strongly leached, have a low reserve of plant nutrients, and low base saturation. The soils are acidic with pH ranging from **4.0 to 5.5**, with no discernible change in pH to a depth of about 3 m. The site area has red lateritic soils with a loamy clayey sub-layer.

6.7 Hydrology and Drainage

The nearest surface hydrological resources include **Chambishi stream** located about **7.65 km south** of the proposed project site, and **Lulamba stream** located about **1.75 km north**. The natural drainage course runs from north-west to south-east, leading to the **Mwambashi River**. Intermittent and ephemeral drainage courses around the project site drain into the Chambishi stream, which subsequently drains into the Mwambashi River near Sabina area. The Mwambashi River is part of the dendritic perennial flows of the **upper Kafue River basin**, commanding storm drainage to flow south-east toward the Kafue River. The Mwambashi River drains into the Kafue River about **15 km south-east** of the project site at Ganerton in Kitwe District.

Water samples were collected from Lulamba stream, Combined drain and Chambishi stream. All parameters were below the statutory limits. The water quality results from the Lulamba Stream and the Combined Drain and the Chambishi Stream are attached in the Appendix.

6.8 Geology of the Area

The project site is underlain by the **pre-Cambrian Lufubu super-group** consisting of Lufubu schists and gneisses, with granitic intrusion bodies dating as far back as 1,975 million years (Cahen et al., 1970). These bodies intrude into the Lufubu super-group and the pre-Cambrian Muva super-group (mainly quartzites). The site geology is characterized by widespread low-grade copper mineralization, which is common in these granitic bodies, with the immediate surrounding area having high-grade copper mineralization where mining activities currently take place. The regional strata belong to the **lower Roan Sub-group**, including conglomerates and sandstones. No active regional faults are found within the site scope.

6.9 Ecological Resources

6.9.1 Fauna

No large animals are reported to be seen on the site except for some insects and small mammals. The following are some of the terrestrial species seen and/or reported to be present on site:

Table 11 Reported/Sighted Fauna around Project Site

SN.	Scientific Name	Common Name
1	<i>Melanoplus bivittatus</i>	Grasshopper
2	<i>Mantis religiosa</i>	Praying mantis
3	<i>Agelenopsis aperta</i>	Grass spider
4	<i>Lacertilian</i>	Lizards
5	<i>Ratus</i>	Rats

There are no rare or endangered terrestrial species seen or reported to be present on site.

6.9.2 Bird Species

Within the site no birds were noticed; however, from consultations, the following bird species occur around the site and have been observed within the area: common bulbul (*Pycnonotus barbatus*), zitting cisticola (*Cisticola juncidis*), marsh warbler (*Acrocephalus palustris*), and streaky seedeater (*Serinus striolatus*). There are no endangered bird species.

6.9.3 Aquatic Fauna

Table 12 Fish Species reported in Mwambashi River

Common Name	Scientific Name	Max Length (cm)
Vundu	<i>Heterobranchus longifilis</i>	150
Three-spot Tilapia	<i>Oreochromis andersonii</i>	60
African Pike	<i>Hepsetus odoe</i>	70
Cornish Jack	<i>Mormyrops anguilloides</i>	150
Eastern Bottlenose	<i>Mormyrus longirostris</i>	75
Yellow-belly Bream	<i>Serranochromis macrocephalus</i>	42
African Lungfish	<i>Protopterus annectens</i>	100
Thinface Bream	<i>Serranochromis angusticeps</i>	41
Longfin Tilapia	<i>Oreochromis macrochir</i>	43
Rednose Labeo	<i>Labeo altivelis</i>	40
Zambezi Parrotfish	<i>Hippopotamyrus discorhynchus</i>	31

Imberi	<i>Brycinus imberi</i>	19
Northern Dwarf-Squeaker	<i>Synodontis nigromaculatus</i>	39
Kafue Pike	<i>Hepsetus cuvieri</i>	30

There are no endangered species in the nearby stream.

6.9.4 Flora

The site has vegetation mainly comprising grass, *Isberlinia angolensis* (Benth.), *Brachystegia longifolia* (Mupuchi), *Azelia quanzensis* (Mupapa), *Pterocarpus angolensis* (African teak), and *Pteridium aquilinum* (fern). The area is largely wasteland with minimal vegetation, surrounded by existing industrial operations. There is no endangered flora on site.

6.9.5 Vegetation Type in the Project Area

6.9.5.1 Aquatic Flora

Aquatic flora species identified in the Mwambashi River include: water hyacinth (*Eichornia crassipes*), cattail (*Typhaceae*), water clover (*Marsileaceae*), water lily (*Nymphaeaceae*), mosquito ferns (*Salvinaceae*), phragmites (*Molinieae*), and parrot's feather (*Myriophyllum aquaticum*). There are no endangered or rare species identified at the site.

6.10 Land Use

The proposed area is one of the fastest-growing industrial areas in the country, as it is a designated mining area characterized by a chain of locally and foreign-owned mineral processing companies, namely Chambishi Metals, NFCA, and other heavy industrial entities. The site is classified as state land under the Kalulushi Municipal Council, held under a mining lease by Sino-Metals Leach Zambia Limited.

6.11 Built Environment

The Kalulushi Central Business District (CBD) is located about **22 km south** of the proposed project site. The **Chingola-Kitwe Road (T3)**, located about **500 m** away, is the nearest access road. Other nearby landmarks include Eco Petroleum Filling Station (about 2.12 km north-east), Cosak Substation CEC (about 1.95 km north-east), Chambishi Metals (about 1.39 km east), and JCHX Mining Limited (about 3.21 km south-east).

6.12 Social, Economic and Cultural Issues

6.12.1 Social Economy

The mine is one of the main sources of employment in the area. Subsistence farming involving arable and livestock farming is another substantial source of income. The local economy is historically and presently dominated by mining and its associated industries, but agriculture remains a critical source of subsistence and income, especially in the surrounding rural wards. Agriculture is the primary livelihood for much of the population, particularly in rural wards like Mwambashi and Musakashi.

6.12.2 Administration

The district operates under a dual system of governance:

- **Central Government:** Headed by the District Commissioner, who coordinates all government functions and developmental activities.
- **Local Government:** Kalulushi Municipal Council, headed by an elected Mayor, is responsible for local policy and development. The district is divided into one constituency (Kalulushi) and 24 wards, each represented by an elected councillor.

The area has one Member of Parliament, the mayor, District Commissioner, and a Municipal Council that handles social, economic, agricultural, and health issues of the town and areas falling under the municipal council.

6.12.3 Population Growth Rate, Density and Distribution

Kalulushi District's population has demonstrated consistent growth, increasing from 96,206 in 2010 to 170,918 in 2022, reflecting an average annual growth rate of 2.9%. The specific population of the Chambishi area is **54,865** (ZAMSTATS, 2022). Population density is unevenly distributed, with higher concentrations in urban and peri-urban wards (Twaiteka, Sitwe, Lulamba, and Chambishi) due to economic activities, and lower densities in rural wards (Lukoshi, Musakashi, and Mwambashi). A notable trend of rural-urban migration, driven by the search for employment and services, continues to shape this distribution.

Table 6.5: Population Distribution in the 7 Wards

Item	Ward	Population
1	Chambishi	8,169
2	Lukoshi	1,480
3	Lulamba	11,507
4	Musakashi	894
5	Mwambashi	4,405
6	Sitwe	11,917
7	Twaiteka	16,493
Total		54,865

The district has a youthful population pyramid, with a significant proportion of inhabitants under the age of 35. This demographic structure implies a large current and future working-age population, presenting a potential demographic dividend for economic growth. The population is nearly evenly distributed by sex, with a slight female majority (86,613 females to 84,305 males).

6.13 Archaeological Site and Cultural Tradition

No historical or archaeological resources were observed within the license area during the baseline assessment. There were no notable materials of cultural or historical significance identified.

Chance Find Procedure: In the event that any archaeological or cultural heritage materials are discovered during exploration activities (e.g., trenching, drilling), work in the immediate vicinity will cease, and the National Heritage Conservation Commission (NHCC) will be notified immediately for assessment and direction.

6.14 Land Tenure

All land within the boundaries of Chambishi is classified as state land. There is no customary land in the township. The Kalulushi Municipal Council (KMC) holds delegatory powers under the Lands Act to plan and administer land within the district, excluding areas administered under the Minerals Regulation Commission Act and the Forests Act.

6.15 Interested and Affected Parties

Interested and affected parties identified are:

- Chambishi Metals Plc and NFCA Mining Plc and their employees
- Companies providing goods and services to Sino-Metals
- Municipal council and its employees
- Government employees
- Local communities in Chambishi

7. ENVIRONMENTAL AND SOCIAL IMPACTS

This section identifies the potential positive and negative environmental and social impacts associated with the proposed project. For each impact, specific enhancement or mitigation measures are proposed, reflecting the project's location, its scale, and its operational phases.

7.1 Positive Impacts

ID	Impact Category	Description	Enhancement Measures
P1	Provision of Employment	The TSF extension project will provide direct employment for approximately 150 construction workers (during the 6–8 month construction phase) and 5 permanent operational staff (during the 10-year operation phase). Priority will be given to local residents from Chambishi and surrounding wards (Mwambashi, Lulamba, etc.).	Develop a local recruitment policy that prioritises qualified candidates from Kalulushi District. Provide on-the-job training and skills transfer in earthworks, HDPE liner installation, embankment compaction, and monitoring.
P2	Increased Public Revenue	The project will contribute to public revenue through Pay As You Earn (PAYE) for employees, corporate tax, VAT on construction materials, and local taxes/rates payable to Kalulushi Municipal Council.	Ensure timely and accurate remittance of all statutory contributions. Maintain transparent financial records for audit purposes.
P3	Multiplier Effects on Local Economy	The project will boost local economic activity through procurement of goods and services from local suppliers (e.g., sand, gravel, cement, protective wear, catering). Workers' spending will generate additional economic benefits in Chambishi and Kalulushi.	Encourage contractors to purchase materials from local vendors. Engage local subcontractors where feasible. Document local procurement to demonstrate economic benefits.
P4	Skills Transfer and Capacity Building	Local workers will gain valuable skills in rolled earth-rock embankment construction, HDPE	Implement a structured training programme for all local workers. Provide

		geomembrane laying, spillway construction, groundwater monitoring, and environmental management. These skills are transferable to future mining and civil works.	certificates of completion for training. Document skills development outcomes.
P5	Responsible Tailings Management (Zero Discharge)	The fully lined TSF (1.5 mm HDPE geomembrane) will enable recycling of decant water back to the leach plant, achieving zero discharge under normal operations and reducing fresh water abstraction.	Maintain the liner and water recycling system according to design specifications. Monitor groundwater (3 wells) quarterly to verify no seepage. Report water balance annually to ZEMA and WARMA.
P6	Post-Closure Land Rehabilitation	After decommissioning, the tailings surface will be capped with loam and planted with native grass, restoring the site to a stable, vegetated landform, reducing long-term environmental liability, and improving local aesthetics.	Implement the closure plan as approved. Maintain the vegetation for at least 2 years after planting. Conduct post-closure monitoring for a minimum of 5 years.

7.1 Negative Impacts and Mitigation Measures

ID	Impact Category	Description	Mitigation Measures	Responsible Party
SE1	Increased Spread of HIV/AIDS and STIs	The influx of approximately 100 construction workers (and subsequent 5 permanent staff) may increase the risk of HIV/AIDS and other sexually	Conduct mandatory HIV/AIDS awareness programmes for all workers. Distribute free condoms in male and female toilets. Encourage voluntary testing and provide	Human Resources, SHEQ Manager

		transmitted infections among workers and the local community.	referrals to local health facilities.	
SE2	Increased Risk of Malaria and Other Communicable Diseases	Workers living in temporary accommodation and the local community may be exposed to malaria, particularly during the rainy season. Stagnant water from construction activities could create mosquito breeding sites.	Provide mosquito nets for workers where accommodation is provided. Ensure no stagnant water accumulates on site (fill depressions, drain standing water). Maintain good hygiene practices. Provide information on malaria prevention to workers.	SHEQ Manager, Site Supervisor
SE3	In-Migration and Pressure on Local Services	Job seekers may be attracted to Chambishi area, potentially increasing pressure on local services such as health facilities, water supply, and schools.	Implement a local recruitment policy (priority to Kalulushi District residents). Engage with Kalulushi Municipal Council and health facilities to coordinate support. Monitor any changes in service utilisation.	Human Resources, Community Liaison Officer
SE4	Traffic Safety Risks	Increased vehicle movements (trucks, water bowzers, excavators) on access roads (north side road, Pond F Road) and the Chingola-Kitwe Road may pose	Install appropriate road signage (speed limits, caution signs). Enforce speed limits (max 20 km/hr on gravel roads). Conduct driver safety training. Use a traffic management plan during construction. No	Safety Officer, Site Manager

		safety risks to pedestrians, cyclists, and other road users.	tailings transported by road.	
EN1	Air Pollution (Dust and Emissions)	Dust generation from site clearing, earthworks, demolition of internal embankments, vehicle movements, and wind erosion from exposed areas. Gaseous emissions from construction machinery and pumps.	Water bowser spraying on all active work areas and access roads. Limit vehicle speed. Provide dust masks to workers. Maintain machinery to minimise emissions. Restrict high-dust activities during high winds where possible.	SHEQ Manager, Site Agent
EN2	Noise Pollution	Elevated noise levels from excavators, compactors, trucks, demolition, and construction activities. Operational noise is minimal (pipeline). Potential disturbance to nearby communities (Chambishi, Mwambashi).	Use modern, well-maintained equipment. Provide hearing protection (earplugs, earmuffs) to workers. Limit construction activities to daytime hours where feasible. Conduct noise monitoring at site boundaries.	SHEQ Manager, Site Agent
EN3	Contamination of Surface Water	Risk of sediment-laden runoff from exposed areas entering Chambishi stream	Construct perimeter diversion ditches (V-shaped, lined) to divert clean runoff away from the TSF.	Site Environmental Manager, Site Agent

		(7.65 km south) or Lulamba stream (1.75 km north). Potential hydrocarbon spills from machinery.	Schedule earthworks during dry season where possible. Use spill kits and refuel in designated bunded areas. Zero discharge under normal operations.	
EN4	Contamination of Groundwater	Potential seepage of tailings liquor through the liner if defects occur. Risk of hydrocarbon infiltration from fuel or oil spills.	Use 1.5 mm HDPE composite geomembrane as primary barrier. Install 3 groundwater monitoring wells (north, west, south outer toes) and sample quarterly. Implement spill prevention and response procedures.	Site Environmental Manager, SHEQ Manager
EN5	Loss of Biodiversity	Minimal vegetation loss on the 17-ha western extension area (currently wasteland). No endangered species identified. Temporary disturbance to birds and small fauna from noise and human presence.	Limit clearing to the required footprint. Avoid clearing of any trees with bird nests during breeding season (where possible). Prohibit hunting or trapping of wildlife (including birds). Report any rare species sightings to Department of National Parks and Wildlife.	SHEQ Manager, Site Agent
EN6	Soil Contamination	Potential spills of hydrocarbons (diesel, oil) during refuelling or	Store fuel and oils in bunded areas (110% containment). Use drip pans during refuelling.	SHEQ Manager, Site Agent

		machinery maintenance. Risk of tailings leakage if liner fails (mitigated by design).	Maintain spill kits on site. Collect used oil and hazardous waste for disposal by licensed contractor. Line the entire TSF with 1.5 mm HDPE geomembrane.	
EN7	Solid Waste Generation	Construction waste (HDPE offcuts, concrete, packaging, demolition debris) and domestic waste (food waste, paper, plastics) from workers.	Segregate waste at source (hazardous vs non-hazardous). Reuse excavated material as embankment fill where possible. Dispose of non-hazardous waste at Kalulushi Municipal Council designated landfill. Hazardous waste (used oil, contaminated HDPE) managed under SI No. 112 Part IV.	Site Supervisor (Waste), SHEQ Manager
EN8	Land Degradation and Land Use Change	Permanent change of land use from wasteland to industrial TSF (irreversible). Temporary disturbance from earthworks and demolition.	Keep disturbance to the minimum footprint. Topsoil stripping for later use in closure. After decommissioning, cap with loam and plant native grass to restore vegetative cover. Maintain perimeter fence to prevent unauthorised access.	SHEQ Manager, Closure Specialist
EN9	Visual and Landscape Disturbance	The new embankments (max height 22.5 m) and lined pond will alter	Design slopes to blend with natural topography where possible. Final closure includes	Site Manager, Closure Specialist

		the local landscape in an already industrial area.	capping and grass planting to improve aesthetics. Maintain security fencing and signage.	
EN10	Occupational Health and Safety Risks	Workers exposed to hazards: dust, noise, heavy machinery, working at heights (embankments), manual handling, and potential slips/trips.	Provide full PPE (helmets, gloves, boots, hi-vis, dust masks, hearing protection). Conduct daily toolbox talks and safety inductions. Appoint a dedicated safety officer. Implement emergency response plan.	SHEQ Manager, Site Agent
EN11	Fire Risk	Bush fires could start from machinery sparks, fuel handling, or camp activities, affecting surrounding vegetation and nearby communities.	Maintain a fire break around the TSF and camp area. Prohibit open fires and bush burning. Provide fire extinguishers at strategic locations (fuel storage, plant, office). Train workers in fire prevention and response.	SHEQ Manager, Safety Officer
EN12	Embankment Stability and Dam Safety	Risk of slope failure, settlement, or overtopping during extreme flood events (0.5% exceedance probability).	Engineered design with slopes 1:2.5 (north/west) and 1:2.75 (south). Spillway on south dam crest to safely convey floods. Manual monitoring: 8 displacement points, 8 seepage points, 1 water	Senior Geotechnical Engineer, SHEQ Manager

			level point. Independent geotechnical review.	
EN13	Post-Closure Long-Term Seepage	Potential long-term seepage if HDPE liner degrades over time (e.g., after 50+ years).	1.5 mm HDPE geomembrane designed for durability. Post-closure groundwater monitoring (3 wells) for at least 5 years. Maintain records for regulatory review. If seepage detected, implement remediation plan.	SHEQ Manager, Closure Specialist

8. Evaluation of impacts

8.1 Nature of Impact

This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. Its description should include what is being affected and in what way.

8.1.1.1 Direct Impact

This is an impact that appears immediately as a result of an activity from such a project. For example, the clearing of the 15-hectare footprint for Cell 2 is a direct impact on land cover.

8.1.1.2 Indirect Impact

This is an impact that is related to the project but that arises from an activity of the project at a secondary level. For example, pumping tailings via a 500 m pipeline may indirectly reduce traffic accidents on local roads that would otherwise occur with truck transport.

8.2 Spatial Extent

This is the physical and spatial size of the impact. It is a description of whether the impact would occur on a scale described as follows:

8.2.1.1 Site

This is an impact that has effects on a measurable portion of the whole – e.g., dust generation within the 15-ha TSF footprint.

8.2.1.2 Local

An impact that could affect the extended area adjacent to the site, perhaps a neighbourhood or small town, say affect environmental media up to 15 km outside the immediate environment – e.g., noise reaching nearby villages in Kalulushi district.

8.2.1.3 Regional

This is an impact that could affect the area including the outlying zones of the city, the transport routes and the adjoining towns – e.g., regional groundwater quality impacts from a major liner failure (mitigated by design).

8.2.1.4 National

This is an impact that could be as far reaching as trans-boundaries – e.g., loss of copper export revenue if the plant shuts down due to inadequate tailings capacity.

8.3 Duration of Impact

8.3.1.1 Temporal Duration

The lifetime of the impact; this is measured in the context of the life-time of the proposed development (estimated 10–15 years of operation plus closure).

8.3.1.2 Short Term

This is an impact that will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the project development phase – e.g., construction dust suppressed by water bowsers.

8.3.1.3 Medium Term

This refers to an impact that will last for the period of the development phase, thereafter could be entirely negated – e.g., noise from earthmoving equipment during construction of Cell 2.

8.3.1.4 Long Term

This is an impact that will continue or last for the entire operational life of the development, but could be mitigated by direct human action or by natural processes thereafter – e.g., ongoing monitoring of groundwater from 3 wells.

8.3.1.5 Permanent

This is the only class of impact which will be non-transitory. Mitigation is either by man or by natural process and will not occur in such a way or in such a time span that the impact can be considered transient – e.g., the permanent change of land use from wasteland to TSF on the 15-ha site.

8.4 Sensitivity

A description of whether or not the sensitivity (magnitude) of the impact would be high, medium, low or negligible (no impact). An attempt could be made to quantify the impacts on components of the affected environment such as how destructive, or benign an impact is. Does it destroy the impacted environment, alter its ecological functioning capacity, or slightly alter it? These are rated as follows:

8.4.1.1 Low

Where the impact will not have significant influence on the environment, and this will not be required to be significantly accommodated in the project design or implementation; the impact alters the affected environment in such a way that natural processes or functions are not affected in any significant way – e.g., minor vegetation loss on already bare land.

8.4.1.2 Moderate

Where it could have an adverse influence on the environment which would require modification of the project design or alternative implementation schedules; the affected environment is altered, however,

function and process continue, albeit in a modified way – e.g., temporary noise disturbance during construction.

8.4.1.3 High

This applies to where an impact could have significant influence on the environment but cannot be mitigated or be accommodated by the project environment by introducing development modification. Function or process of the environment is disturbed to the extent where it temporarily or permanently ceases – e.g., a major tailings liner failure (designed against with composite liner and leak detection).

8.5 Probability

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

8.5.1.1 Unlikely

The probability of the impact occurring is very low, due to the circumstances, design or experience – e.g., catastrophic TSF failure with composite liner and third-party review.

8.5.1.2 Possible

The impact could possibly happen, and mitigation planning should be undertaken – e.g., minor spill of fuel during servicing of construction equipment.

8.5.1.3 Probable

It is most likely that the impact will occur at some or other stage of the development. Plans must be drawn up before the undertaking of the activity – e.g., dust generation during site clearing of the 15-ha footprint.

8.5.1.4 Definite

The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans can be relied on to contain the effect – e.g., change of land use from wasteland to TSF.

8.6 Determination of Significance

Significance is determined through a synthesis of impact characteristics or combination of effects. Significance is an indication of the importance of the impact in terms of physical extent, intensity and time scale, and therefore indicates the level of mitigation required. The classes are rated as follows:

8.6.1.1 Negligible

The impact is not substantial and does not require any mitigation action.

8.6.1.2 Low

The impact is of little importance but may require limited mitigation.

8.6.1.3 Moderate

The impact is of importance and therefore considered to have mitigation. Mitigation is required to reduce the negative impacts to acceptable levels or positive impacts maximized.

8.6.1.4 High

The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential. Positive impacts should be enhanced as a priority.

The evaluation of impacts using these criteria is presented in Table 3 below:

Table 13 Evaluation of Impacts

Impact	Type of Impact	Duration	Intensity / Severity	Spatial Extent	Frequency	Likelihood	Sensitivity	Overall Significance
CONSTRUCTION PHASE								
Dust releases due to exposed work sites (western extension & new dam footprints) – nuisance to neighbours	Direct	Short-term (during earthworks)	Moderate	Local	Daily during clearing	Probable	Medium	Low
Noise from construction machinery (excavators, compactors, trucks)	Direct	Short-term (construction period)	Moderate	Local	Daily during construction	Probable	Moderate	Low
Dust releases due to exposed work sites – nuisance to workers	Direct	Short-term	Moderate	Site	Daily during construction	Probable	High	Moderate
Dust emissions from pipeline installation (trenching)	Direct	Short-term	Low	Site	Intermittent	Possible	Medium	Low
Contamination of surface and ground water by workers' sanitary waste or oil spillages from maintenance	Direct	Medium-term (if unmitigated)	Moderate	Site	Not expected (mitigation in place)	Possible	High	Moderate
Contamination of run-off and ground water from construction activities	Direct	Medium-term	Low	Site	Not expected	Unlikely	High	Low

					due to measures			
Contamination of surface and groundwater due to tailings (during construction – none)	Direct	Long-term	Low	Site	Not expected due to 1.5 mm HDPE liner	Unlikely	Low	Low
Erosion and siltation of downstream drainage system from exposed soils	Direct	Short-term	Low	Local	During rains	Possible	Moderate	Low
Reduced occupational health and safety (injuries from demolition, earthworks, liner installation, spillway construction)	Direct	Medium-term	Moderate	Site	Daily	Probable	High	High
Risk of accident involving members of the public near construction site	Direct	Short-term	Low	Site	Not anticipated	Unlikely	High	Low
Risk of water-borne diseases due to potential pollution sources	Direct	Short-term	Low	Site	Not often	Unlikely	High	Low
OPERATIONAL PHASE								
Reduced air quality due to dust emissions from exposed tailings beach	Direct	Long-term	Low	Site	Monthly	Possible (but mitigated by moisture)	Moderate	Low

Noise nuisance from pumping station and decant system	Direct	Long-term	Negligible	Site	Continuous	Unlikely (pipeline is quiet)	Moderate	Negligible
Contamination of run-off due to oil spills or leaks from TSF equipment	Direct	Long-term	Low	Local	Not anticipated	Unlikely (bunded areas)	Low	Low
Increased traffic/road congestion (construction vehicles only – tailings piped)	Direct	Long-term	Low	Local	Daily during rare maintenance	Unlikely (no tailings trucks)	Low	Negligible
Reduced road safety (no tailings transport)	Direct	Long-term	Low	Local	Not expected	Unlikely	High	Low
Risk of water-borne diseases due to water contamination (zero discharge under normal operations; spillway for floods)	Direct	Long-term	Low	Local	Not anticipated	Unlikely	High	Low
Groundwater contamination from liner leakage (1.5 mm HDPE geomembrane with sub-membrane drainage)	Direct	Long-term	Low	Site	Continuous monitoring	Unlikely (design prevents)	High	Low
Embankment stability failure (rolled earth-rock dam, engineered slopes, independent review)	Direct	Long-term	High (if occurs)	Regional	Rare	Unlikely	High	Moderate (mitigated)

9. POSSIBLE ANALYSIS INFORMATION GAPS

Baseline environmental and social data for the proposed TSF extension (TD15G to TD15G-1) by Sino-Metals Leach Zambia Limited were collected through field investigations, stakeholder consultations (including the scoping meeting held on 15th May 2026 at the site premises), and laboratory analyses. This work was undertaken to establish existing environmental conditions within the proposed project area (western extension of TD15G, Chambishi, Kalulushi District) and the surrounding settlements (Chambishi, Mwambashi, Lulamba, Sitwe, Twaiteka, Lukoshi, Musakashi) prior to project implementation.

- The baseline assessment covered the following key environmental and socio-economic components, as outlined in the approved Terms of Reference:
- Ambient air quality and dust fallout
- Surface water resources (Chambishi stream, Lulamba stream, and the Mwambashi River within the upper Kafue River basin)
- Groundwater resources (shallow aquifers and potential seepage pathways)
- Soil quality (focus on topsoil for rehabilitation, pH, heavy metals)
- Vegetation and terrestrial ecology (minimal vegetation, wasteland, protected flora species)
- Fauna (mammals, avifauna, reptiles, with focus on species of conservation significance)
- Socio-economic characteristics of surrounding communities (Chambishi, Mwambashi, Lulamba, and other Kalulushi District wards)

All baseline studies were conducted in accordance with applicable national guidelines and minimum statutory requirements, including those of ZEMA, the Minerals Regulation Commission (MRC), and the Forestry Department.

9.1 Air Quality Monitoring

Ambient air quality monitoring was undertaken to establish background concentrations of particulate matter (PM_{2.5} and PM₁₀) and CO₂ prior to the commencement of any construction activities. Monitoring locations were selected to be representative of the proposed TSF extension footprint, access roads, and potential sensitive receptors (nearest communities are approximately 1.5–2 km from the site).

Table 14 Air Quality Monitoring Results

Location	Coordinates	Elevation (m)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	CO ₂ (ppm)	Temperature (°C)	Humidity (%)	Noise – Min (dBA)	Noise – Max (dBA)	Remarks
Point A	-12.64295 / 28.02488	1344	24.7	35.1	399	21	48	52.2	64.4	Moderate
Point B	-12.64702 / 28.02398	1132	22.3	33.8	466	22	45	47.3	51.5	Good
Point C	-12.64500 / 28.02644	1304	27.2	40.0	452	–	–	52.3	65.0	Moderate
Point D	-12.64203 / 28.02623	1334	29.7	36.9	–	–	–	42.7	54.4	Moderate

9.1.1 Data Adequacy and Gaps

While the monitoring programme meets the prescribed regulatory standards for baseline characterisation, a longer-term monitoring programme (covering both wet and dry seasons) would provide enhanced temporal representation of air quality conditions. This is particularly relevant for understanding seasonal variations in dust levels from natural sources (dry season) versus project-related activities (construction earthworks, vehicle movements).

The collected data, however:

- Adequately represents existing background conditions for the key assessment period.
- Provides a reliable benchmark against which future project-related impacts (e.g., dust from earthworks, demolition, vehicle movements on access roads, embankment construction) can be assessed.
- Establishes compliance reference values for the operational and decommissioning monitoring phases.

9.2 Water Resources Assessment

Baseline water quality sampling was conducted for Chambishi stream (approximately 7.65 km south of the site) and Lulamba stream (approximately 1.75 km north). This is critical for a project that will involve earthworks, HDPE geomembrane lining, and zero-discharge water management, all of which have the potential to impact water resources if not properly managed.

9.2.1 Data Adequacy and Gaps

The baseline assessment identified Chambishi stream and Lulamba stream as the primary surface water receptors within the upper Kafue River basin. A key data gap to be addressed during the operational phase is a more detailed hydrogeological study to characterise shallow aquifer sensitivity, particularly in the western extension area where the TSF will be constructed. Long-term data on groundwater levels and quality (before, during, and after construction and operation) will be valuable for demonstrating no lasting impact. The quarterly groundwater monitoring from 3 wells (north, west, south outer toes) will address this gap.

9.2.2 Ongoing Data Strengthening

Notwithstanding full compliance with minimum baseline requirements, the project commits to strengthening environmental datasets through:

- Continued water quality monitoring (quarterly) of the 3 groundwater monitoring wells during the operational phase, with a focus on parameters relevant to tailings management (pH, turbidity, hydrocarbons, heavy metals – Cu, Co, etc.).
- Periodic review of monitoring results to detect any environmental trends or potential impacts from liner integrity or drainage blind ditches.
- Adaptive management measures to be implemented should monitoring results indicate deviations from acceptable thresholds (e.g., increased turbidity or hydrocarbon detection, elevated metal concentrations).

- A detailed flora and fauna inventory will be developed and maintained during the operational phase, using quarterly visual assessments to track biodiversity within and around the TSF footprint.

This approach ensures that environmental management remains proactive, data-driven, and responsive throughout the project lifecycle, from construction through decommissioning and post-closure monitoring.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

An Environmental and Social Management Plan (ESMP) has been developed to guide the implementation of mitigation, monitoring, and reporting measures throughout the project lifecycle of the proposed TSF extension (TD15G to TD15G-1). This plan covers all three main phases: construction, operation, and decommissioning.

The ESMP provides a structured framework for:

- Mitigating identified environmental and social impacts specific to TSF extension activities (demolition of internal embankments, construction of new rolled earth-rock embankments, HDPE geomembrane lining, spillway construction, groundwater monitoring well installation, and water management).
- Monitoring compliance with Zambian statutory requirements (S.I. No. 3 of 2026, Environmental Management Act No. 12 of 2011, Minerals Regulation Commission Act No. 14 of 2024, and other applicable legislation) and international best practices (ICOLD, GISTM, ISO 14001).
- Assigning clear institutional responsibilities for environmental and social performance, including the SHEQ Manager, Site Agent, Safety Officer, and Community Liaison Officer.
- Ensuring continuous environmental performance improvement and adaptive management through regular monitoring, audits, and corrective actions.
- Providing a budget for environmental management activities, including dust suppression, waste management, groundwater monitoring, and post-closure rehabilitation.

Table 15: Environmental and Social Management Plan

Identified Impact	Aspect	Objectives	Mitigation / Enhancement Measures	Frequency	Timeframe	Performance Indicators	Responsible Person	Cost (ZMW)
POSITIVE IMPACTS								
Boost in employment rates	Employment	To provide employment to nearby communities	Priority given to local residents from Kalulushi district for 150 construction jobs and 5 permanent positions	Monthly	All phases	No labour disputes; workers satisfied	Human Resources	10,000/month
Payment of legal fees	Government income boost	To ensure all legal aspects are met	Monthly returns and payments to ZRA, ZEMA, Ministry of Mines, and local council	Monthly	All phases	No outstanding balances	Accounts Manager	9,000/month
NEGATIVE IMPACTS – CONSTRUCTION PHASE								
Air quality	Dust emissions from site	To minimise	Water bowser spraying on all work	Daily	Throughout construction	Reduction in visible	Site Agent	15,000/month

	clearing, earthworks, and vehicles (western extension & new dam footprints)	dust nuisance	areas and access roads; equipment routinely maintained to reduce exhaust emissions			dust; complaints from community		
Ecological resources	Loss of minimal vegetation on western extension and new dam footprints	To minimise loss of vegetation and fauna	Site is largely wasteland with minimal vegetation; no additional clearing beyond required footprint; fauna disturbance temporary	Daily	Throughout construction	No unauthorised clearing; no animal deaths	SHE Officer	10,000/month
Surface water	Contamination from runoff or spills	To avoid contamination and erosion	Construction scheduled in dry season; machinery serviced offsite to prevent oil spills; diversion ditches in place	Monthly	Throughout construction	No visible contamination in nearby drainage	Site Agent	13,000/month

Groundwater	Contamination from oil spills or fuel leaks	To prevent groundwater contamination	Machinery serviced in designated bunded areas; no refuelling near drainage; spill kits available	Monthly	Throughout construction	No elevated hydrocarbons in monitoring wells	Site Agent	12,000/month
Occupational health and safety	Accidents and injuries to workers (demolition, earthworks, liner installation, spillway construction)	To ensure health and safety on site	Daily toolbox talks; full PPE (helmets, gloves, boots, hi-vis); first-aid trained personnel	Daily	Throughout construction	Zero lost-time injuries	Site Agent	12,000/month
Traffic and road safety	Disruption on access road from construction vehicles	To minimise traffic disruption	Designated access routes (north side road and Pond F road); warning signs and flagmen; no tailings transported by road	Daily	Throughout construction	No accidents; no community complaints	Site Agent	12,000/month
Solid waste generation	Construction waste (packaging,	To minimise waste and	Segregation at source; non-hazardous waste	Daily	Throughout construction	Visual cleanliness;	Site Supervisor (Waste)	10,000/month

	offcuts, debris, demolition waste)	ensure proper disposal	to Kalulushi council landfill; hazardous waste (e.g., contaminated HDPE offcuts) managed under SI No. 112			no illegal dumping		
Public health	Dust affecting nearby communities	To minimise public health risks	Routine water spraying on access roads and active work areas; speed limits for vehicles	Daily	Throughout construction	No health complaints from community	Site Manager	10,000/month
NEGATIVE IMPACTS – OPERATIONAL PHASE								
Surface water	Contamination from tailings effluent	To prevent water contamination	Tailings neutralised at plant before pumping; deposited at 75% solids (semi-dry); zero discharge under normal operations (spillway for floods)	Monthly	Throughout operation	No effluent leaving site; pools never overflow	Site Agent	13,000/month

Groundwater	Seepage from tailings or oils	To prevent groundwater contamination	1.5 mm HDPE composite geomembrane anti-seepage layer over entire pond area; sub-membrane drainage layer (0.5 m crushed stone + geotextile) draining to toe prism and blind ditches; equipment serviced in designated areas; 3 monitoring wells (north, west, south outer toes)	Monthly	Throughout operation	No change in water quality in downgradient wells	Site Agent	12,000/month
Ecological resources	Loss of vegetation or disturbance	To minimise ecological loss	No further clearing; existing access roads used; only the western extension and new dam footprints utilised (largely wasteland)	Yearly	Throughout operation	Zero net loss of trees; no bird deaths	Environmental Manager	15,000/month

Air quality	Dust from tailings beach (minimal)	To ensure clean air	Tailings pumped as slurry (75% solids) via pipeline; beach kept moist; no road transport of tailings	Monthly	Throughout operation	Dust levels below ZEMA thresholds	Site Manager	10,000/month
Public health (HIV/AIDS)	Spread of HIV/STI due to workforce	To minimise public health risks	Mandatory HIV/AIDS awareness talks for all workers; free condoms in male and female toilets; referral for testing	Monthly	Throughout operation	No increase in local infection rates	Site Manager	10,000/month
Solid waste	Domestic waste from workers	To minimise waste and ensure proper disposal	Kitchen and sanitary waste in covered bins; collected weekly by licensed hauler to council landfill	Monthly	Throughout operation	No litter; no complaints	Site Supervisor (Waste)	10,000/month
Occupational health and safety	Injuries, fire, or chemical exposure	To minimise risks	Daily safety talks; full PPE; site access restricted with fence and guardhouse; fire extinguishers available	Daily	Throughout operation	Zero accidents or incidents	SHE Officer	15,000/month

Soil contamination	Spills of oil, fuel, or tailings	To reduce soil contamination	All storage areas (fuel, oils) banded; tailings only in lined TSF G-2; daily visual inspections; spill response kit	Monthly	Throughout operation	No change in soil pH or hydrocarbon content	Site Manager	5,000/month
Noise	Noise from pumps and occasional machinery	To reduce noise nuisance	Earmuffs/plugs for workers; equipment routinely serviced; pumps enclosed where possible	Weekly	Throughout operation	No complaints from nearby communities	Site Supervisor	5,000/month
Land use change	Conversion of farmland/waste land to industrial TSF	To ensure surrounding areas unaffected	Lease agreement in place; no harmful chemicals released; closure plan includes capping and revegetation	Monthly	Throughout operation	No community complaints	Site Supervisor	5,000/month
Resettlement	Displacement of people	To ensure no one is displaced	No settlements within the project footprint (wasteland and existing industrial area)	Yearly	Throughout operation	No displacement claims	Site Supervisor	5,000/month

Livelihood	Loss of agricultural activities	To safeguard livelihoods	Project activities will not destroy adjacent agriculture; buffer zone maintained	Daily	Ongoing	No complaints from farmers	Site Supervisor	5,000/month
Access routes	Loss of access to water, gardens, firewood	To maintain access	No public access routes will be closed; existing paths remain open	Once	Ongoing	No community complaints	Plant Supervisor	5,000/month
Customary rights	Exploitation or disregard of local values	To safeguard community rights	Community leaders engaged regularly; grievance mechanism in place; respect for local traditions	Daily	Ongoing	No unresolved complaints	Plant Supervisor	5,000/month
Amenity values	Loss of visual or recreational amenity	To preserve amenities	Site will be fenced and landscaped; final closure includes vegetation planting	Daily	Ongoing	No complaints	Site Supervisor	12,000/month
Ethnicity (culture and tradition)	Loss of cultural values	To preserve cultural traditions	No traditional ceremonies on site; company will work with local leaders to uphold any identified values	Daily	Ongoing	No complaints	Plant Supervisor	5,000/month

NEGATIVE IMPACTS – DECOMMISSIONING PHASE								
Solid waste	Tailings and demolition waste	To ensure adequate disposal	Tailings remain in place under loam cap; demolition waste (concrete, HDPE) removed to licensed landfill	Daily	Monthly management	No illegal dumping	Company Supervisor	15,000
Air quality	Dust from capping and earthworks	To minimise air pollution	Cap constructed with moisture control; revegetation with native grasses and trees to suppress long-term dust	Weekly	Until Mines Dept approval	Dust within thresholds	Company Supervisor	15,000
Surface and groundwater	Long-term seepage from tailings	To prevent contamination	Loam cap with grass planting (no geomembrane cap required per FSR); post-closure monitoring of 3 wells for at least 5 years	Monthly	Throughout decommissioning	No exceedance of water quality standards	Company Supervisor	15,000

Occupational health and safety	Risks during capping and demolition	To safeguard workers	Full PPE; safety training for decommissioning tasks; access restricted	Daily	During decommissioning	Zero injuries	SHE Officer	15,000
Noise	Noise from machinery (excavators, compactors)	To protect workers and community	Modern, serviced equipment; limited working hours; hearing protection for workers	Weekly	Until final closure	No community complaints	SHE Officer	10,000
Soil contamination	Residual contamination	To minimise soil contamination	Post-closure soil sampling around perimeter; any hotspot remediated	Weekly	Up to final closure	No change in soil parameters	SHE Officer	15,000
Public health	Safety of community near closed TSF	To minimise public health risks	Perimeter fence maintained; warning signs; no public access; monitoring for any subsidence or erosion	Daily	Ongoing	No drownings or injuries	Company Supervisor	10,000
TOTAL ESTIMATED								357,000

MONTHLY COST (Operational Phase)								
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10.1 Environmental Monitoring Plan

The table below shows the monitoring activities that will take place throughout the project phases (preparation, operation, decommissioning, and post-closure).

Table: Environmental Monitoring Plan

Aspect	Monitoring Activity and Parameters	Frequency	Responsible Personnel	Cost (ZMW/month)
Air (dust and exhaust fumes)	Air sampling using air sampler (dust, NO _x , SO ₂ , CO)	Monthly	SHE Officer	20,000
Vegetation	Visual assessment of vegetation cover and health on and around site	Monthly	SHE Officer	15,000
Noise / Vibration	Noise measurement using decibel meter at site boundary and nearby residences	Monthly	Plant and Machinery Supervisor	10,000
Effluents / Water quality	Sampling from 3 groundwater monitoring wells (north, west, south outer toes), toe drainage ditch – parameters: pH, TDS, TSS, turbidity,	Monthly	Laboratory Technician	12,000

	coliforms, BOD, COD, Cu, Co, other heavy metals			
Solid waste (non-hazardous)	Weighbridge records of waste disposed to council landfill	Monthly	Departmental Supervisor	5,000
Hazardous waste (oils, spent liners)	Volume of waste oil collected and disposed via licensed contractor; records of HDPE offcuts	Monthly	Fuel Supervisor	12,000
TOTAL MONTHLY MONITORING COST				74,000

11. DECOMMISSIONING AND CLOSURE PLAN

This phase will be implemented at the end of the TSF's operational lifespan, currently estimated at **10 years** from the commencement of tailings deposition. Decommissioning may also be triggered earlier if the facility reaches its design capacity earlier than projected, or if the developer decides to terminate operations for any other reason. The primary goal is to return the TSF footprint (embankments, pond area, access roads, and ancillary infrastructure) to a safe, stable, and self-sustaining condition that is compatible with the surrounding industrial and natural environment in Chambishi, Kalulushi District, Copperbelt Province.

Objectives of Decommissioning

- To ensure the long-term safety of the public, wildlife, and the environment.
- To cap the tailings surface with loam and establish vegetative cover to control dust and erosion.
- To maintain the perimeter fence, locked gate, and warning signs to prevent unauthorised public access.
- To remove all temporary surface infrastructure (monitoring equipment, pipelines, pumps) and manage waste responsibly.
- To rehabilitate all disturbed land (borrow pits, access roads, construction laydown areas) using stored topsoil and natural regeneration where feasible.
- To address the socio-economic impacts of project closure on employees and the local community (Chambishi, Mwambashi, and surrounding wards).

Main Activities

The decommissioning process will be guided by a detailed **Decommissioning and Closure Plan**, approved by ZEMA and the Minerals Regulation Commission (MRC). Key activities will include:

- **Capping of Tailings Surface:** The tailings surface will be covered with loam (minimum cover thickness) to control dust and erosion. The cap will be designed to minimise water infiltration and promote vegetation establishment. No geomembrane cap is required per the Feasibility Study Report.
- **Vegetation Establishment:** Native grass species will be planted on the capped surface to establish erosion-resistant vegetation. The vegetation will be maintained for at least 2 years after planting.
- **Removal of Surface Equipment and Infrastructure:** All temporary surface infrastructure will be removed, including pipelines (HDPE), monitoring equipment (displacement points, piezometers, video cameras), pumps, and any other surface installations. Reusable items will be removed and either stored or sold. Non-reusable items will be disposed of responsibly.
- **Perimeter Fence and Security:** The 2.4 m high chain-link fence with razor wire, locked gate, and warning signs will be maintained to prevent public access to the closed TSF.

- **Drainage System Maintenance:** The toe drainage ditch and spillway (if not decommissioned) will be maintained to ensure continued drainage of surface water and to prevent erosion.
- **Borrow Pit Rehabilitation:** Any borrow pits used for embankment construction will be rehabilitated by reshaping slopes, backfilling with overburden where possible, and establishing vegetation to prevent erosion.
- **General Site Clean-up:** A final site-wide clean-up will be conducted to remove all debris, litter, empty containers, and residual waste. The site will be left in a condition that allows natural regeneration where feasible.

Contaminated Soil Management

A post-decommissioning soil survey will be conducted to identify any areas contaminated by hydrocarbons (fuel or lubricant spills) or other hazardous materials. If any contaminated soil is found:

- Small areas will be excavated and treated on site using bioremediation (if feasible and approved by ZEMA); or
- Contaminated soil will be transported to a ZEMA-licensed hazardous waste disposal facility.

Public Safety During and After Decommissioning

- **During Decommissioning:** The site will remain under the control of the SHEQ Manager. Warning signs will be posted at access points. Local communities (Chambishi, Mwambashi, and surrounding wards) will be informed of the decommissioning activities through the community liaison officer.
- **Post-Closure:** The capped tailings surface will be stable and no permanent hazardous areas are expected. However, local communities will be advised to report any unusual ground settlement, subsidence, or water quality changes to Sino-Metals Leach Zambia Limited or Kalulushi Municipal Council.

Social Aspects of Closure

Sino-Metals Leach Zambia Limited recognises that the end of the TSF's operational phase may result in the loss of employment (5 permanent staff). The company is committed to:

- Providing workers with adequate notice (at least one month) before cessation of operations.
- Issuing certificates of service and providing references to assist workers in securing alternative employment.
- Where possible, offering skills training certificates (e.g., TSF operations, environmental monitoring, HDPE liner installation) to enhance employability.
- Engaging local leaders, village headpersons, ward councillors, and Kalulushi Municipal Council to discuss any potential community benefits from the project (e.g., improved access roads, water monitoring data).

- Finalising any outstanding CSR commitments made during the operational period.

Table: Decommissioning and Closure Plan

Aspect / Activity	Detailed Actions	Implementing Organization	Responsible / Oversight Authority	Estimated Duration	Estimated Cost (US \$)
Capping of Tailings Surface	Place loam cover over the tailings surface (minimum thickness as per closure design). Grade and compact the surface to promote drainage.	Sino-Metals Leach Zambia Limited (SHEQ Manager, Contractor)	ZEMA, MRC	2–3 months	1500,000
Vegetation Establishment	Plant native grass species on the capped surface. Establish erosion-resistant vegetation. Maintain for 2 years.	Sino-Metals Leach Zambia Limited (Contractor)	ZEMA, Forestry Department	2 months (initial) + 2 years maintenance	100,000
Removal of Surface Infrastructure	Remove all surface equipment: pipelines (HDPE), monitoring equipment (displacement points, piezometers,	Sino-Metals Leach Zambia Limited (SHEQ Manager)	ZEMA, Kalulushi Municipal Council	1 month	60,000

	video cameras), pumps, and temporary buildings. Recycle or dispose responsibly.				
Perimeter Fence and Security	Maintain 2.4 m high chain-link fence with razor wire, locked gate, and warning signs to prevent public access.	Sino-Metals Leach Zambia Limited	Kalulushi Municipal Council	Ongoing (indefinite)	40,000 (one-time repair budget)
Drainage System Maintenance	Inspect and maintain toe drainage ditch and any remaining drainage structures to prevent erosion and manage surface water.	Sino-Metals Leach Zambia Limited	ZEMA, WARMA	Ongoing (during and after closure)	30,000
Borrow Pit Rehabilitation	Reshape slopes, backfill with overburden where possible, and establish vegetation to prevent erosion.	Sino-Metals Leach Zambia Limited	ZEMA, Forestry Department	1 month	40,000
General Site Clean-up and Landscaping	Final site-wide clean-up: remove all debris, litter,	Sino-Metals Leach Zambia Limited (SHEQ	ZEMA	2 weeks	40,000

	empty containers, and residual waste. Lightly rake remaining disturbed areas to blend with surrounding topography. Conduct final walk-through.	Manager, Environmental Officer)			
Post-Closure Monitoring	Monitor: • Groundwater quality (3 wells – north, west, south outer toes) – quarterly for at least 5 years • Cap integrity and vegetation health – biannually • Settlement and stability – annually	Sino-Metals Leach Zambia Limited (or contracted environmental consultant)	ZEMA, MRC, WARMA	Minimum 5 years (or as agreed with ZEMA)	150,000 (annual)
Social Closure Program	Provide worker notices, certificates, and references. Engage with and Kalulushi Municipal Council. Finalise CSR commitments.	Sino-Metals Leach Zambia Limited (HR Manager, Community Liaison Officer)	Kalulushi District Social Welfare Office,	Ongoing during closure phase	40,000

TOTAL ESTIMATED CLOSURE COST					2,000,000
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12. ENVIRONMENT, HEALTH AND SAFETY (EHS)

Sino-Metals Leach Zambia Limited is committed to protecting the health and safety of its workers, contractors, and the surrounding communities (Chambishi, Mwambashi, Lulamba, and surrounding wards), as well as the environment in which it operates. This commitment will be embedded in a comprehensive Health, Safety and Environmental (HSE) Management System that covers all phases of the proposed TSF extension project. The system will align with Zambian national legislation (including the Occupational Health and Safety Act No. 36 of 2010 and the Minerals Regulation Commission Act No. 14 of 2024) and international good practice for tailings storage facility construction and operation involving earthworks, heavy machinery (excavators, compactors, trucks), and hazardous materials (diesel, lubricants, HDPE geomembrane).

12.1 Safety

The safety management system will focus on identifying and eliminating or minimising occupational safety and health risks associated with TSF extension activities: demolition of internal embankments, earthworks, embankment construction, HDPE geomembrane laying, spillway construction, vehicle movements on access roads, site operations, fuel handling, and use of heavy machinery. While Sino-Metals management has the principal responsibility for safety, all employees, contractors, and visitors share an obligation to maintain a safe working environment.

12.2 Aims

- To establish and benchmark Safety Management Systems against international best practice for tailings storage facility construction and operation.
- To achieve **Zero Fatality** and **Zero Lost Time Injuries (LTIs)** through proactive hazard identification, near miss reporting, and robust risk management for all critical jobs, including earthworks, embankment compaction, and HDPE liner installation.
- To foster a positive safety culture where every individual takes ownership of their safety and that of their colleagues.

12.3 Objectives

- Ensure identification, elimination, or control of safety risks in the workplace, including those specific to earthworks, heavy machinery operations, vehicle movements, and working at heights (embankments).
- Identify training needs and ensure all jobs are performed by qualified and competent personnel, particularly for high-risk tasks like excavator operation, HDPE liner welding, and fuel handling.
- Ensure compliance with all relevant Zambian legal guidelines, MRC directives, and Sino-Metals' safe operating procedures.
- Ensure thorough Incident and Accident Investigations are conducted, with timely implementation of corrective actions to prevent recurrence.
- Ensure effective management of contractors and visitors at all facilities through strict compliance to safety norms.

- Ensure preparedness for emergencies, including fire, fuel spills, embankment instability, and medical emergencies, with adequate prevention and response capabilities.
- Promote a positive safety culture through interactive safety management systems at all levels of the organisation.
- Encourage continuous improvement of safety management through recognition awards for outstanding safety performance.

12.4 Action Plan for Probable Accidents and Incidents

The following table outlines the potential accidents and incidents specific to the proposed TSF extension project, along with the preventive measures and emergency response actions that will be implemented.

Table: Action Plan for Probable Accidents and Incidents

Potential Accident / Incident	Preventive Measures (Project Specific Controls)	Management and Emergency Response Actions
Heavy Machinery Incident – excavator, compactor, truck (rollover, collision, crushing, entanglement)	• Only trained and competent operators allowed to operate machinery. • Mandatory pre-start inspection of all machinery (brakes, hydraulics, lights, horns). • Establish safe zones around operating machinery. • Use of spotter/flagman during reversing and tight manoeuvres. • Seat belts mandatory on all machinery.	• Stop equipment immediately; isolate power. • Provide first aid (first aid kit at site office). • Transport injured person to nearest clinic (Kalulushi/Kitwe). • Notify SHEQ Manager and MRC. • Investigate root cause and implement corrective actions.
Diesel / Hydrocarbon Spill – from fuel storage, machinery refuelling, or during maintenance	• Fuel stored in designated bunded area (110% containment capacity). • Drip pans used during refuelling. • Spill kits (absorbent mats, booms, gloves) at fuel storage area and machinery maintenance area. • Strict "No Smoking" policy in fuel area. • Routine inspection of fuel containers and hoses.	• Contain spill immediately using spill kit; prevent entry into soil or water. • Notify SHEQ Manager. • Excavate contaminated soil if necessary. • Dispose of contaminated material as hazardous waste via licensed contractor. • Report to ZEMA if spill leaves site or enters watercourse.

Embankment Slope Failure / Instability – during construction or operation	• Engineered design with slopes 1:2.5 (north/west) and 1:2.75 (south). • Compaction $\geq 96\%$ of standard Proctor density. • Routine monitoring: 8 displacement points, 8 seepage points, 1 water level point. • Independent geotechnical review. • Spillway on south dam crest for flood events (0.5% exceedance).	• Evacuate area immediately. • Notify SHEQ Manager and MRC. • Assess stability; implement emergency repairs. • Investigate root cause; adjust design or construction methods. • Report to ZEMA.
HDPE Liner Damage / Tear – during installation or operation	• Use of geotextile cushion layer beneath HDPE liner. • Quality control during welding (peel tests, vacuum tests). • No sharp objects on working surface. • Routine visual inspections during construction and operation.	• Stop work in affected area. • Isolate the damaged section. • Repair using patch welding or replacement. • Notify SHEQ Manager. • Review quality control procedures.
Working at Heights – embankment construction, spillway construction	• Use of safety harnesses and lanyards when working at heights >2 m. • Secure scaffolding and platforms. • Mandatory hard hats and safety boots. • Tool tethering to prevent dropped objects.	• Provide first aid; transport to clinic if needed. • Notify SHEQ Manager. • Investigate cause; ensure safety measures are in place.

Vehicle Accident – on access roads or Chingola-Kitwe Road (collision, rollover, pedestrian/livestock strike)	• Implement Traffic Management Plan. • Enforce speed limits: 20 km/hr on gravel access roads, 50 km/hr on Chingola-Kitwe Road. • Install warning signs at access points. • All drivers licensed and trained; defensive driving course. • No overloading; seat belts mandatory.	• Provide emergency medical assistance; call ambulance (999). • Inform Police (991) and RTSA. • Secure scene; warn other traffic. • Record and investigate incident; retrain driver if necessary.
Bush Fire – from machinery sparks, fuel handling, or camp activities	• Maintain fire break around site and fuel storage area. • Clear vegetation around machinery and generator. • Fire extinguishers (water, sand, dry chemical) at site office, fuel area, generator, and machinery. • Prohibit starting bush fires; strictly enforce during dry season. • Fire prevention training for all workers.	• Raise alarm; evacuate personnel to safe area. • Attempt to extinguish fire using extinguishers, beaters, or sand if small. • Call Fire Brigade (993) if uncontrolled. • Notify local communities. • Investigate cause and implement corrective actions.
Manual Handling Injury – lifting heavy materials (HDPE rolls, concrete blocks, pipes)	• Provide training on correct lifting techniques. • Use mechanical aids (trolleys, lifting straps) where possible. • Team lifting for heavy items. • Rotate tasks to prevent repetitive strain.	• Provide first aid; treat minor sprains/strains at site. • Transport serious injuries to clinic. • Record incident; review task to reduce risk.

Slips, Trips, and Falls – at site, embankment slopes, spillway (uneven ground, wet surfaces, cables)	• Maintain good housekeeping at all areas. • Keep walkways clear of hoses, tools, debris. • Adequate lighting at site and temporary offices. • Mandatory safety boots (steel toe, slip resistant). • Immediate clean-up of any spills (oil, water).	• Provide first aid. • Record incident; investigate cause. • Implement corrective action (e.g., reroute cables, improve lighting).
Snake or Insect Bite – puff adder, cobra, scorpions, spiders (common in area)	• Wear long trousers and boots in the field. • Use torch when walking at night. • Shake out boots and clothing before wearing. • First aid kit with snake bite bandages and antivenom guidance. • Workers trained in basic first aid for bites.	• Keep victim calm; immobilise limb. • Apply pressure bandage (for snake bite) – do not wash wound. • Transport immediately to nearest clinic (Kalulushi/Kitwe). • Notify SHEQ Manager.
Heat Stress / Dehydration – during hot season (Aug–Oct), temperatures up to 35°C	• Provide ample drinking water at site and all work areas. • Schedule heavy work during cooler morning hours. • Rest breaks in shaded areas. • Sun hats and sunscreen provided. • Workers trained to recognise heat stress symptoms.	• Move affected person to shade; provide cool water. • Fan and apply cool wet cloths. • Seek medical help if confusion or loss of consciousness. • Rehydrate slowly.

Medical Emergency (non-injury) – malaria, severe illness, allergic reaction	• Mosquito nets and repellents provided to workers where accommodation is provided. • Maintain clean site environment; no stagnant water. • First aid kit with basic medicines. • Medical evacuation plan to Kalulushi/Kitwe hospitals.	• Provide first aid; monitor vital signs. • Arrange transport to nearest health facility. • Notify SHEQ Manager. • Keep record of illness for health monitoring.
Community Incident – dust nuisance, noise complaint, traffic accident involving community member	• Dust suppression (water bowsers) on access roads and work areas. • Speed limits enforced. • Grievance Redress Mechanism (dedicated liaison officer, feedback register, toll-free line). • Regular community meetings local leaders and ward councillors.	• Respond immediately to complaint. • Investigate the source. • Implement corrective action (e.g., increase dust watering, adjust work hours). • Communicate findings and actions to community.

12.5 General Safety Guidelines and HSE Management

12.5.1 Occupational Health, Safety and Environmental (HSE) Management

Sino-Metals Leach Zambia Limited shall implement a structured Health, Safety and Environmental (HSE) Management System for the proposed TSF extension project. The system aligns with national legislation (Environmental Management Act No. 12 of 2011, Occupational Health and Safety Act No. 36 of 2010, S.I. No. 3 of 2026) and international good practice for tailings storage facility construction and operation involving earthworks, heavy machinery, HDPE liner installation, and water management.

12.5.2 Site Access Control and Security

- All personnel entering the site shall sign the daily attendance register, present valid identification, and attend a mandatory site safety induction before commencing work.
- Access to restricted areas (fuel storage, machinery operating areas, embankment construction zones) shall be limited to authorised personnel only.
- A zero-tolerance policy for drugs and alcohol will be strictly enforced; random breathalyser tests may be conducted.

12.5.3 Traffic and Vehicle Management

Given the site's access via the Chingola-Kitwe Road (T3, approximately 500 m away) and existing access roads (north side road, Pond F Road), the following controls shall be implemented:

- Speed limits: 20 km/hr on gravel access roads; 50 km/hr on Chingola-Kitwe Road.
- Road signage: Warning signs at access points and along roads near settlements (Chambishi, Mwambashi).
- All vehicles (including contractor vehicles) must be roadworthy; drivers must hold valid licenses.
- No non-essential personnel or unauthorised vehicles allowed on site.

12.5.3.1 Code of Conduct

All personnel shall comply with environmental and safety procedures, respect the local values and customs of the community, and avoid any unsafe behaviour. Smoking is strictly prohibited in all operational and hazardous zones (fuel storage area, machinery operating areas, and within 10 m of any hazardous work).

12.5.4 Personal Protective Equipment (PPE)

Minimum mandatory PPE for all personnel and visitors in operational areas (site office, embankment construction, spillway construction, machinery areas) shall include:

- Hard hat
- High visibility clothing (vest or jacket)
- Steel toe safety boots
- Safety glasses

Additional task-specific PPE (mandatory):

Task / Area	Additional PPE
Earthworks / embankment construction – operator and assistant	Earmuffs or earplugs, gloves, dust mask (N95)
HDPE liner installation / welding	Safety glasses, gloves, dust mask
Spillway construction (concrete works)	Safety glasses, gloves, rubber boots
Fuel handling / refuelling	Chemical resistant gloves, safety glasses, apron
Machinery / generator operation	Ear protection, gloves
Any dusty area (dry season)	Dust mask (N95 or better)
Night work (if any)	Head torch / flashlight, reflective vest

12.5.4.1 Incident Reporting and Investigation

All incidents, including near misses, spills, fires, injuries, or any environmental contamination, shall be immediately reported to the SHEQ Manager and the Project Manager. All incidents will be documented, thoroughly investigated to determine root cause, and corrective actions will be implemented and tracked to completion. Incident reports will be submitted to ZEMA and MRC as required by S.I. No. 3 of 2026 and the Minerals Regulation Commission Act No. 14 of 2024.

12.5.5 Emergency Preparedness and Response

A comprehensive site-specific Emergency Response Plan will be developed and maintained. The plan will cover scenarios including:

- Fire (bush, fuel, machinery, site office)
- Hydrocarbon spill (diesel, lubricants)
- Embankment instability (cracks, slumping)
- HDPE liner failure (detected via monitoring)
- Medical emergency (injury, snake bite, heat stroke, malaria)
- Vehicle accident on access roads or Chingola-Kitwe Road
- Severe weather (flooding, lightning)

Emergency contact numbers will be prominently displayed at the site office and each work area:

- Fire Brigade: **993**
- Police: **991**
- Ambulance: **999**
- Kalulushi District Hospital / Kitwe Teaching Hospital
- ZEMA
- MRC (Minerals Regulation Commission)

Regular emergency drills, including evacuation and fire drills, will be conducted for all site personnel at least once every 6 months.

12.5.5.1 Fire Prevention and Response

High risk fire areas include the fuel storage area, machinery parking area, site office, and generator. The following controls apply:

- Fire extinguishers (dry chemical or CO₂) located at: site office (2 units), fuel storage area (2 units), generator (1 unit), machinery area (1 unit).
- Sand buckets and fire beaters at site office and fuel area.
- Fire break maintained around the site perimeter and fuel storage area.
- Vegetation cleared within 5 m of generator and fuel storage.
- "No open flames" policy near fuel and generator.
- All workers trained in use of fire extinguishers and fire response.

12.5.5.2 Chemical and Hydrocarbon Spill Management

- Fuel storage area: bunded area (110% containment capacity).
- Spill kits (absorbent mats, socks, gloves, disposal bags) located at: fuel storage area (1 kit), machinery maintenance area (1 kit), and each worksite.
- All personnel working in these areas will be trained in spill response procedures (contain, report, clean up, dispose).
- In the event of a major spill, the priority is to contain it, prevent it from entering the environment (especially Chambishi stream, 7.65 km south, and Lulamba stream, 1.75 km north), and notify the SHEQ Manager immediately.

12.5.6 Occupational Health Programme

The health programme shall include:

- Pre-employment medical examination for all workers (including screening for fitness for manual labour and exposure to dust).
- Periodic medical examinations (annually) for workers exposed to silica dust (earthworks personnel, heavy machinery operators) in accordance with the Pneumoconiosis Act No. 13 of 1994.
- Regular monitoring of occupational hygiene hazards: dust (visual, and quarterly PM_{2.5} monitoring), noise (quarterly sound level checks).
- First aiders trained and available on each shift (minimum 2 per shift). First aid kits at site office, each work area, and each vehicle.
- Health and wellness programs: HIV/AIDS awareness sessions (quarterly), malaria prevention (mosquito nets where accommodation provided, repellents, site hygiene), and hygiene promotion (handwashing, safe water).

12.6 Conclusion

The proposed TSF extension will implement a proactive HSE and Emergency Management System tailored to the specific risks of tailings storage facility construction and operation in the industrial and peri-urban environment of Chambishi, Kalulushi District. With strict adherence to safety protocols (PPE, training, incident reporting), robust environmental controls (1.5 mm HDPE geomembrane lining, drainage blind ditches, bunded fuel storage, spill kits,

fire breaks, groundwater monitoring wells, and zero-discharge water management), and thorough emergency preparedness (drills, contact numbers, first aid), the project is expected to operate safely while delivering socio-economic benefits to the local communities of Chambishi, Mwambashi, Lulamba, and surrounding wards, as well as Kalulushi District and the broader Copperbelt Province.

DECLARATION

I, HAO BO being the Developer/project proponent, hereby declare that the information provided in this report is true to the best of my knowledge and shall provide any additional information that shall come to my notice in the course of processing this application.



Signature

Date 31st July, 2026

References

- Environmental Management Act (EMA), 2011
- Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, SI No.28, 1997
- IFC general guidelines for air Quality, 2011.
- Hazardous Waste Management Regulations, SI No.125, 2001
- Land Act of 1995
- Local Government Act, Chapter 281
- Town and Country Planning Act, Chapter 283
- Water Pollution Control (Effluent and Waste Water) Regulations, SI No.72, 1993
- Environmental Impact Assessment documents 2008 -2010
- Waste management handbook.
- Storrs, A.E.G. (1995). “Know Your Trees” some of the common trees found in Zambia. Forestry Research Bulletin No.3. Forestry Department, Zambia.
- Fanshawe, D. B. (1971). The Vegetation of Zambia. Forestry Research Bulletin No. 7. Forestry Department, Zambia.
- Elsa Pooley (1998). A Field Guide to Wild Flowers KwaZulu-Natal and the Eastern Region, Natal Flora Publication Trust.
- Chidumayo, E.N. (1997). Miombo Ecology and Management. IT Publications in Association with Stockholm Environmental Institute, London.

12.7 Appendix 1: TOR Approval Letter



ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY RESPONSE LETTER

01 Jul, 2026

{serial_no}

The Chief Executive Officer
Sino Metals Leach Zambia Limited
Plot No. 10/M/F
Off Chingola Road
KALULUSHI

Dear Sir/Madam,

REF: APPROVAL OF THE TERMS OF REFERENCE AND SCOPING REPORT FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED EXPANSION OF TAILINGS DAMS TD15G CHAMBISHI, KALULUSHI DISTRICT BY SINO METALS LEACH ZAMBIA 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 (EIA) of the said proposed project.

We would like to inform you that the Terms of Reference (TORS) have been **approved**.

Therefore, you may now proceed to conduct the EIA. The approved TORS and EIA team members are as follows:

1. PROJECT SITE LOCATION AND BRIEF PROJECT DESCRIPTION

Sino Metals Leach Zambia Limited proposes to extend Tailings Dam (TD) No. 15G. The proposed TSF extension will involve extending the northern and southern embankments and constructing a new western embankment. The expanded dam will be called TD15G-1. The total storage capacity of the combined TD15G-1 facility will be 5.48 million m³ (effective capacity 4.76 million m³) and cover an area of 100,000m². The extension will feature a rolled earth- rock embankment with a maximum height of 22.5 m and gentle slopes (inner slope 1:2.5, outer slopes 1:2.5 for north/west and 1:2.75 for south), carefully designed to provide permanent containment and stability. The entire pond area will be equipped with a 1.5 mm thick HDPE composite geomembrane anti-seepage layer, which will effectively prevent seepage and protect groundwater. The expanded dam will receive tailings pumped from the leach plant facility via a pipeline (HDPE, approximately 0.4 m diameter) and discharged into the tailings pond in slurry form at a solids content of approximately 75%. The existing Tailings Storage Facility (TD15 G) has a total storage capacity of 1.836 million m³ and an area of about 130,000 m².

The project will involve the construction of the following facilities:

- i. Tailings Groundwater monitoring wells;
- ii. Slurry Pipeline;
- iii. Perimeter surface water diversion ditch;
- iv. Access TSF perimeter road;
- v. Water management (settling ponds); and
- vi. Embankment instrumentation.

The proposed project site is located in Chambishi area of Kalulushi District, Copperbelt Province.

The Kalulushi Central Business District (CBD) is located about 22Km South of the proposed project site. The proposed site of the TD15G-1 is located on the west side of TD15G. To the immediate east of TD15G, there is pond F. There is an external access road about 200m to the north and 150 m- 550 m to the west of TD15G.

The proposed site is located on the coordinates delineated below:

SN.	Latitude	Longitude
1.	12°39'04.13"S	28° 1'17.30"E
2.	12°39'03.41"S	28° 1'41.70"E
3.	12°38'50.87"S	28° 1'45.69"E
4.	12°38'49.37"S	28° 1'33.93"E
5.	12°38'28.28"S	28° 1'37.49"E
6.	12°38'17.53"S	28° 1'20.40"E

2. EIA TEAM MEMBERS

S/NO	NAME	RESPONSIBILITY/EXPERTISE
1	Moses Mutambala	Team Leader-Oversight, reporting, and coordination

		Livelihoods, demographics, and community impact Archaeology assessments
3	Suwilanjji Sinkamba	Geotechnical and Civil Engineer-Analysis of TSF stability.
4	Chanda Kabwe	Environmental and Social Safeguards-Impact predictions and Monitoring
5	Beauty Banda	Hydrologist/Hydrogeologist and GIS Expert-Hydrological modelling, GIS Mapping and Spatial analysis
6	Mwelwa Musosha	Ecological Survey Expert-Biodiversity surveys and rehabilitation planning.

3. TERMS OF REFERENCE

The approved TORS are those which were submitted to ZEMA as revised TORS. The approved TORS include the following:

- Air quality, which should include effects on the quality of the ambient air of the area as well as type of pollutants.
- Noise and vibration;
- Hydrology/water resources;
- Biodiversity surveys;
- Geology;
- Soils;
- Leach residue/tailings management;
- Social impact assessment;
- Land use assessment; and
- Landscape and visual assessments.

4. EIS REPORT FORMAT TO BE USED

The EIS format to be used is the one attached.

We anticipate your cooperation.

GENERIC FORMAT FOR ENVIRONMENTAL IMPACT STATEMENTS

1.0 Executive Summary

- *Briefly describe the project background, objectives, location, shareholders, investment cost, relevant legislation, project description, technology, project alternatives, main findings, mitigation measures and lifespan.*
- *The executive summary should be signed by the developer and the EIA study team.*

2.0 Non-technical summary (In English and a local language commonly understood in the project area)

Table of Contents

3.0 Introduction

- 3.1 Background of the project
- 3.2 Summary description of the project including project rationale
- 3.3 Objectives of the project
- 3.4 Brief description of the location
- 3.5 Particulars of Shareholders/Directors
- 3.6 The developer's physical address and the contact person.
- 3.7 Track Record/Previous Experience of Enterprise Elsewhere
- 3.8 Total Project Cost/Investment
- 3.9 Proposed Project Implementation Date

4.0 Policy, Legal and Institutional Framework

(cite all Policy, legal and institutional framework relevant to the project)

5.0 Project Description

- 5.1 Location
 - *Include distances and nature of business of surrounding community*
 - *Satellite images*
 - *Maps*
 - *Geographical coordinates*
- 5.2 Project description
 - *Raw materials (including hazardous materials and their storage on site)*
 - *products and by-products*
 - *process and technology (including flow diagrams)*
 - *production capacity*
 - *Schedule and life time of the project*
- 5.3 Main activities
 - *Site preparation phase*

- Decommissioning and Closure phase

6.0 Project Alternatives

Analyse the available alternatives such as but not limited to :

- 6.1 Location Alternatives
- 6.2 Process and technology
- 6.3 Raw materials
- 6.4 Product
- 6.5 Demand Alternatives (Production Capacity)
- 6.6 Justification for the selected option(s)

7.0 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:

- 7.1 Topography
- 7.2 Climate
 - Rainfall, Temperature, Humidity, Sunshine
- 7.3 Air quality
- 7.4 Geology
- 7.5 Hydrology
 - Surface water quality
 - Groundwater quality
- 7.6 Hydrogeology
- 7.7 Soils
- 7.8 Land use
- 7.9 Built Environment
- 7.10 Land tenure
- 7.11 Noise and vibration
- 7.12 Fauna
 - Field survey of animal species (Aquatic and terrestrial)
 - Identification of rare or endangered species
- 7.13 Flora
 - Terrestrial species
 - Aquatic species
 - Identification of rare or endangered species
- 7.14 Birds
 - Field survey of bird species
 - Identification of rare and endangered bird species
- 7.15 Archaeological and cultural environment
 - Sources of raw materials for such events, or location of significant historical or archaeological features
- 7.16 Social-cultural and 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

8.0 Impacts

- 8.1 Biophysical Environment
 - Positive – direct, indirect, short term, long term, reversible and irreversible
 - Negative – direct, indirect short term, long term, reversible and irreversible
- 8.2 Socio-economic and cultural
 - Positive – direct, indirect, short term, long term, reversible and irreversible
 - Negative – direct, indirect short term, long term, reversible and irreversible
- 8.3 Evaluation of impacts significance should combine:
 - the frequency of occurrence of the impact
 - the duration of the impact
 - the spatial extent of the impact
 - the sensitivity of the element being impacted.

9.0 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)

- 9.1 Environment and Social Monitoring Plan (These should include environmental management cost estimates, responsible personnel and the frequency of monitoring)

Aspect*	Impact	Mitigation measure	Frequency of Monitoring	Time frame	Performance indicator	Responsible person	Cost

*NOTE: Aspect is an activity, service or product that is likely to cause an impact due to interaction with the environment

10.0 Decommissioning and Rehabilitation Plan (State environmental management commitments associated with the Decommissioning and Closure Phase for the project)

References (Full references of the main documents cited in the report should be given)

- *A copy of the approved Terms of Reference*
- *Maps and satellite images*
- *Certificate of Incorporation*
- *Investment License*
- *Proof of Public consultation (Minutes and comments from the public during consultation and scoping) and adverts*
- *Land ownership (Title deeds or lease agreement)*
- *Specialised study Reports*
- *Any other relevant supporting documents or information that cannot be presented in the main report*

Yours faithfully,



Mr. Christopher Kanema
Acting Director General
ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

12.8 Appendix 2: Disclosure Meeting Minutes

DISCLOSURE MEETING FOR THE EXPANSION OF TD15G AT SINO METALS LEACH ZAMBIA LIMITED HELD ON THE 10TH JULY 2026 AT THE KALULUSHI MUNICIPAL COUNCIL SUB OFFICE IN CHAMBISHI

The meeting was held on the 10th July 2026 at Kalulushi Municipal Council Sub Office in Chambishi of the Copperbelt Province. The Meeting started at 10 hours and was facilitated by Mr. Wisdom Chasaya of Chabatoto Green Solutions & Consultants of Ndola.

The meeting started with an opening prayer from one of the participants, which was preceded by introductions.

Institutions present and their representatives at the meeting were the following:

- i. District Commissioner's Office
- ii. Developer (SINO METALS)
- iii. Office of The President
- iv. District Health Office
- v. District Agriculture Officer (DACO)
- vi. District Community Development Office
- vii. Ward Development Committee Members (WDCs)
- viii. Nkana Water Supply & Sanitation Company
- ix. Kalulushi District Planning Officer
- x. Chabatoto Green Solution & Consultants

After the introductions and acknowledgements, the meeting proceeded into the main stay of the gathering led by the lead Consultant Mr. Moses Mutambala of Chabatoto Green Solutions. Mr. Mutambala told the meeting that SINO Metals is intending to expand TD15G situated on the company's premises under License N. 8474-HQ-L-ML.

He said that in line with the Provisions of the Environmental Management Act No. 12 of 2011, the Environmental Management (EIA) Regulations, S.I. No. 3 of 2026, the Minerals Regulation Commission Act No. 14 of 2024 and the Mines and Minerals (Environmental) Regulation, S.I. No. 29 of 1997, Sino Metals is required to conduct an Environmental Impact Assessment for the proposed expansion of TD15G.

Mr Mutambala told the meeting that it is for this reason Sino Metals engaged Chabatoto Green Solutions & Consultants of Ndola to carry out an Environmental and Social Impact Assessment on TD15G.

Mr. Mutambala told the gathering that the proposed project TD15G currently has the capacity of 1.836 million m³ covering an area of 130, 000 m². He said the expansion project is intended at increasing the storage capacity of tailings that will be produced from processing 6 million metric tonnes copper ore. He told the meeting that the expanded tailing dam will be called TD15G-1. TD15G-1 will have capacity of 5.48 million m³ covering an area 0.47km². The tailings to be stored in TD15G-1 will be neutralized first to pH of 7.

Mr Mutambala told the meeting that the project area is within the mine area, and it will not affect anything outside the boundaries of the mine area. He told the gathering that the road to Mwambashi that passes on the western side of the mine will remain because it a Government gazetted road.

He told the meeting that the topography of the project area slopes to the south-east.

With regard to Fitanda Market, which is in the north-east direction, only dust from earth moving machines will affect the market during construction phase but thereafter the problem of dust will be no more. Dust suppression during the construction phase will be implemented by means of watering bowsers.

REACTIONS AND QUESTIONS

Mrs. E. P Sichamba

Wanted to know the sources of dust and the duration of the dust emission from the project site Mr. Mutambala responded to the question by stating that dust will mainly be generated during the project site clearance which will only last for 2 to 3 months.

Ms. Chibuye Ngosa

Wanted to know the hectarage that the extension will take up. In his answer, Mr. Mutambala referred back to the presentation where it was stated that the expansion will cover an area 340,000 m². He also stated that no one has been displaced in terms of shelter or crop field. There are no people encroaching in the project area.

Mr. Gregory Musonda

Suggested that to avoid dust affecting the area during the day, construction works should be carried out during the night. Mr. Musonda was informed that uncontrolled dust emission is prohibited both

during the day and night. In addition, due to safety concerns, construction works are prohibited during the night.

Mr. Remmy Chipowe

Requested for more information and collaboration between Sino Metals and Kalulushi District Health Office in malaria prevention.

Mr. Benjamin Machuta

Wanted to know the enhancements that have been include into the construction of the dam embankment. Mr. Musango Muzumara responded by saying that the dams have been equipped with displacement sensors to detect any movements in the embarkment couple with leak detectors.

Mr. Sydney Kafwimbe

Wanted to know if the company would consider fencing the mine area to stop people trespassing and vandalizing company property. Mr. Musango said that the company use Mine and State Police to curb the problem of trespassing and vandalizing property. Anyone found in the area without permission is arrested. When the dam is filled to designed capacity, it will be closed and rehabilitated and monitoring will be passed on to Government if Sino Metals stopped operating the Mine.

After all the questions and reactions were concluded it was time to end the meeting.

Mr. Mutambla in his closing remarks, thanked the representative of the DC Mrs. Sichamba for finding time to attend the Disclosure meeting. He emphasized that such meetings were very important for stakeholder engagement and to make sure no one is left behind on project progression. He thanked all participants for their active role in the meeting, that their engagement was valuable and that everything that was said will be taken into account to help in deciding the outcome of the project.

Mr Mzumara who represented the developer said Sino Metals is here to stay in Chambishi and continue to do mining activities. He said that in the last few months the company has realized the need to engage with the community. He said that all the concerns raised during the meeting will be relayed to the management for consideration.

The meeting concluded with a closing prayer at 13:00.

12.9 Appendix 3: Invitation Letters



RECEIVED BY

SEC

Plot F1008B/148

Water Works Road, Minsundu

P. O. Box 70510, Ndola

Mobile: +260977819283/+260961967581

Email: chabatoto@gmail.com

8 July 2026

DISTRICT COMMISSIONER

KALULUSHI DISTRICT

KALULUSHI



Dear Sir/Madam

RE: INVITATION TO A STAKEHOLDER DISCLOSURE MEETING REGARDING THE PROPOSED EXPANSION OF TAILINGS DAM 15G (TD15G) BY SINO METALS LEACH ZAMBIA LIMITED

Sino Metals is intending to expand TD15G situated on the Company's premises under Licence No. 8474-HQ-LML.

In line with the Provisions of the Environmental Management Act No. 12 of 2011, the Environmental Management (Environmental Impact Assessment) Regulations, S. I. No. 3 of 2026, the Minerals Regulation Commission Act No. 14 of 2024 and the Mines and Minerals (Environmental) Regulations, S. I. No. 29 of 1997, Sino Metals is required to conduct an Environmental Impact Assessment (EIA) for the proposed expansion of TD15G.

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Chabatoto Green Solutions & Consultants has the pleasure of inviting you to a stakeholder disclosure meeting. Details of the meeting are listed below.

Date: Friday, July 10, 2026
Time: 09:00
Venue: Chambishi, Civic Centre

Yours sincerely,

Eng. Moses Mutambala
 Managing Consultant
 Chabatoto Green Solutions & Consultants



Plot F1008B/148
Water Works Road, Minsundu
P. O. Box 70510, Ndola
Mobile: +260977819283/+260961967581
Email: chabatoto@gmail.com

8 July 2026

TOWN CLERK
KALULUSHI DISTRICT COUNCIL
KALULUSHI

Dear Sir/Madam

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Email: chabatoto@gmail.com

8 July 2026

DISTRICT HEALTH OFFICE

KALULUSHI DISTRICT

KALULUSHI



Dear Sir/Madam

RE: INVITATION TO A STAKEHOLDER DISCLOSURE MEETING REGARDING THE PROPOSED EXPANSION OF TAILINGS DAM 1SG (TD1SG) BY SINO METALS LEACH ZAMBIA LIMITED

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Mobile: +260977819283/+260961967581

Email: chabatoto@gmail.com

8 July 2026

DMMU

KALULUSHI DISTRICT

KALULUSHI

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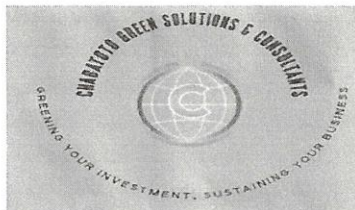
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Managing Consultant
Chabatoto Green Solutions & Consultants

Received : pm mv
Cham2



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Water Works Road, Minsundu
P. O. Box 70510, Ndola
Mobile: +260977819283/+260961967581
Email: chabatoto@gmail.com

8 July 2026

MANAGING DIRECTOR
NKANA WATER & SEWERAGE COMPANY
KITWE

Dear Sir/Madam

RE: INVITATION TO A STAKEHOLDER DISCLOSURE MEETING REGARDING THE PROPOSED EXPANSION OF TAILINGS DAM 15G (TD15G) BY SINO METALS LEACH ZAMBIA LIMITED

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Water Works Road, Minsundu
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8 July 2026

.....
WATER DEVELOPMENT OFFICER
.....
KALULUSHI DISTRICT
.....
..... KALULUSHI.....

Dear Sir/Madam

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Eng. Moses Mutambala
Managing Consultant
Chabatoto Green Solutions & Consultants

P. P. Chaimbo
water development officer



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P. O. Box 70510, Ndola
Mobile: +260977819283/+260961967581
Email: chabatoto@gmail.com

8 July 2026

COMMUNITY DEVELOPMENT OFFICE

KALULUSHI DISTRICT

Dear Sir/Madam

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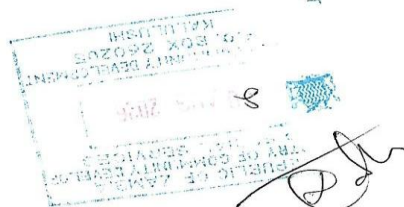
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Eng. Moses Mutambala
Managing Consultant
Chabatoto Green Solutions & Consultants



12.10 Appendix 4: Attendance List



Sino Metals Leach Zambia Limited

ATTENDANCE LIST

STAKEHOLDER DISCLOSURE MEETING FOR THE PROPOSED EXPANSION OF TD15G

Meeting Venue: Chambishi Civic Centre

Date Meeting Held: 10 July 2026

No.	Name	Sex	Organization	Position	NRC No.	Phone No.	Signature
1.	MOSES KAMUSAKI	M		W.D.C	349650/65/1	0767429310	Moses
2.	CHIBWE NGOMA	F	Min. of AGRIC	AGRIC. OFFICER	232061/42/1	0971071232	Chibwe
3.	RAY KAUNDA	M		W.D.C	349782/65/1	0773350401	Ray
4.	F.P. SICHAMISA	F	OOP SD	OIC		0976129104	F.P. SICHAMISA
5.	Benjamin Machuta	M	Nkana Water	SHC Mgr	230099/16/1	0966782807	Benjamin
6.	MUSONDA GREGORY	M	STWE	W.D.C	247049/10/1	0969263477	Musonda
7.	SYDNEY KAPWIMBI	M	STWE	W.D.C SH	376317/65/1	0971093599	Sydney
8.	IDAHA RAMOCHHA	F	W.D.C	SECRETARY	143880/24/1	0963233651	Idaha
9.	Ngulunga Grace	F	W.D.C	chairperson	137139/63/1	0960914719	Ngulunga
10.	CHISHA CHRISPINE	M	W.D.C	SECRETARY	109865/35/1	0977695538	Chisha
11.	BANDA LOTTIE	M	W.D.C	MEMBER	281356/51/1	0964775798	Banda
12.	MUSAGO ZIMARA	M	SMLZ	HOSE OFFICER	489222/67/1	0977752072	Musago
13.							
14.							
15.							



Sino Metals Leach Zambia Limited

ATTENDANCE LIST

STAKEHOLDER DISCLOSURE MEETING FOR THE PROPOSED EXPANSION OF TD15G

Meeting Venue: Chambishi Civic Centre

Date Meeting Held: 10 July 2026

No.	Name	Sex	Organization	Position	NRC No.	Phone No.	Signature
1.	MAMBI MUMBA	M	W.D.C	TREASURER	176118/65/1	096892112	M. Mumba
2.	MEMORY PHIRI	F	W.D.C	MEMBER	186942/63/1	096798953	Memory
3.	FLORENCE LONGWE	F	W.D.C	MEMBER	207293/65/1	0969532268	Florence
4.	FRIDAH KAPUNWE M.	F	W.D.C	MEMBER	244287/33/1	0977361621	Frída
5.	YOTHAM CHIMEMBO	M	W.D.C	TREASURER	286351/61/1	0774363978	Yotham
6.	REMMY CHIPOMBE	M	M.D.H	CEO	461141/67/1	0969965566	Remmy
7.	FRANK MULUNDU	M	NWSC	DE	449107/11/1	0977769261	Frank
8.	SENGA SHADDER	M	CHAMBISHI METALS S.F	SE	131276/65/1	0963906521	Senga
9.	FANACY INAMBAGO	M	W.D.C	MEMBER	247157/24/1	097829268	Fanacy
10.	ANITA CHAMBA	F	OFFICER	OFFICER	221489/77/1	076813794	Anita
11.	MARY CHITAMBALI	F	COM-DEV	CDA	176476/10/1	0978379558	Mary
12.	RUTH MUCWAGO	F	K.M.C	ENVIRONMENTAL MANAGER	129174/87/1	0773885801	Ruth
13.							
14.							
15.							

12.11 Appendix 5: Disclosure Meeting Pictures







12.12 Appendix 6: Surface Water Quality

Lulamba Stream



THE COPPERBELT UNIVERSITY
 School of Mines and Mineral Sciences,
 Department of Environmental Engineering
 P.O Box 21692 – Kitwe – Zambia Cell: 0968-646575 /
 0977-681549

CLIENT ADDRESS	SINO METALS	DATE SUBMITTED
SAMPLE ID	CHAMBISHI	
SERVICES REQUESTED	LULAMBA STREAM	15.04.2026
	Water analysis	

Parameter	Unit	1	2	ZEMA LIMITS
pH		6.29	6.30	6.0 - 9.0
Turbidity	NTU	3.61	3.15	15
Conductivity	µS/cm	113	112	4500
TSS	mg/l	3	2	100
TDS	mg/l	52	52	3000
NO ₃	mg/l	0.36	0.38	45
NO ₂	mg/l	<0.01	<0.01	2
NH ₃ & NH ₄	mg/l	<0.01	<0.01	10
SO ₄	mg/l	7	8	800
Cl ⁻	mg/l	9.86	9.69	800
Fe	mg/l	0.03	0.04	2
Cu	mg/l	0.04	0.05	2.0
Co	mg/l	0.03	0.02	0.5
As	mg/l	<0.01	<0.01	0.5
Ni	mg/l	0.02	<0.01	0.5
Pb	mg/l	<0.01	0.02	0.5
Mn	mg/l	0.05	0.06	1.0
Cd	mg/l	<0.01	<0.01	0.5
K	mg/l	2.13	2.16	12
Zn	mg/l	0.28	0.32	6
Cr	mg/l	<0.01	<0.01	0.5
E. Coliform	cfu /100	13	17	5,000
T. Coliform	cfu /100	146	159	25,000

Prepared By:	Sign:	Date:
	Name: C. Manase	
Authorising Officer's Approval:	Sign:	Date:
	Name: DR J MUNDIKE	17 APR 2026
Designation	Head of Department	

Combined Drain and Chambishi Stream



NKANA WATER SUPPLY AND SANITATION COMPANY

Mutondo Crescent, off Freedom Way, Riverside, Box 20982 Kitwe, Zambia. Corporate Head Office Tel: *260 212 222488, 221099, 0971 223 458 Fax: *260 212 222490

Email: headoffice@nwsc.com.zm www.nwsc.zm

SAFETY HEALTH ENVIRONMENT AND QUALITY DEPARTMENT	
Date Sampled: 11 th JUNE 2026	Client Name: Sino Metals Leach Zambia Limited (SMLZL)
Sample Type : Effluent Water	
WATER ANALYSIS CERTIFICATE	

SAMPLE DESCRIPTION	PARAMETERS UNITS	pH	EC μS/cm	TDS mg/L	TSS mg/L	Sulphates mg/L
Chambishi Stream		8.0	680	409	2.6	228
Combined Drain		8.0	1,660	1,082	<1	1,025
ZEMA Specifications (Effluent Water)		6.0 – 9.0	4300	3000	100	1500
SAMPLE DESCRIPTION	PARAMETERS UNITS	Copper mg/L	Manganese mg/L	Iron mg/L	Cobalt mg/L	Cadmium mg/L
Chambishi Stream		<0.01	0.11	0.20	<0.01	<0.01
Combined Drain		0.40	0.93	0.11	0.47	<0.01
ZEMA Specifications (Effluent Water)		1.5	1.0	2.0	1.0	0.5
SAMPLE DESCRIPTION	PARAMETERS UNITS	Nickel mg/L	Lead mg/L	Zinc mg/L		
Chambishi Stream		<0.01	0.10	<0.01		
Combined Drain		<0.01	0.09	0.28		
ZEMA Specifications (Effluent Water)		0.5	0.5	1.0		

Bigger, Better, Smarter

KEY**TDS** : Total Dissolved Solids**TSS** : Total Suspended Solids**EC** : Electrical Conductivity

QUALITY ASSURANCE OFFICER

BENJAMIN MACHUTA
SHEQ MANAGER*Bigger, Better, Smarter*

12.13 APPENDIX 7: CERTIFICATE OF INCORPORATION PRIVATE COMPANY LIMITED BY SHARES.

Company Registration No. **57192**



Republic of Zambia

**CERTIFICATE OF INCORPORATION
OF A PRIVATE COMPANY LIMITED BY SHARES**

(Section 10)

This is to certify that

.....
SINO-METALS LEACH ZAMBIA
..... Limited (company name)
is on and from the 3rd day of December, 2004
Incorporated as a private company limited by shares.

Given under my hand and seal at Lusaka, Zambia this
3rd day of December, 2004





.....
B. A. Katebe
Acting Assistant Registrar of Companies

[Note that this certificate is not valid unless the official seal of the Registrar of companies has been affixed]

12.14 APPENDIX 8: Investment Certificate

Certificate No ZDA/6076/02/2026

 **ZDA**
potential made possible



ZAMBIA DEVELOPMENT AGENCY
Section 18 (2), Investment, Trade and Business Development Act No 18 of 2022
CERTIFICATE OF REGISTRATION

This is to certify that Sino-Metals Leach Zambia Limited

of Plot No 10/M/F/4

Street/Road Chingola Road

Town/City Kalulushi PO.Box _____

has this 12 day of February 2026

been duly registered to invest in Zambia in the area(s) specified below:

Sector: Mining

Subsector: Mining of Other Non Ferrous Metal Ores

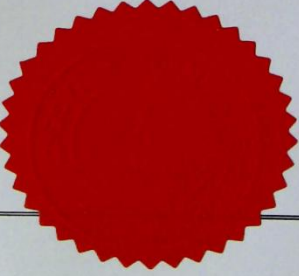
Project description: Mining of Copper Ore

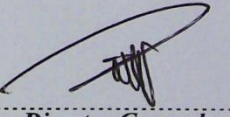
Total Investments: US\$ 50,000,000.00

12/2/2026
Date of Issue

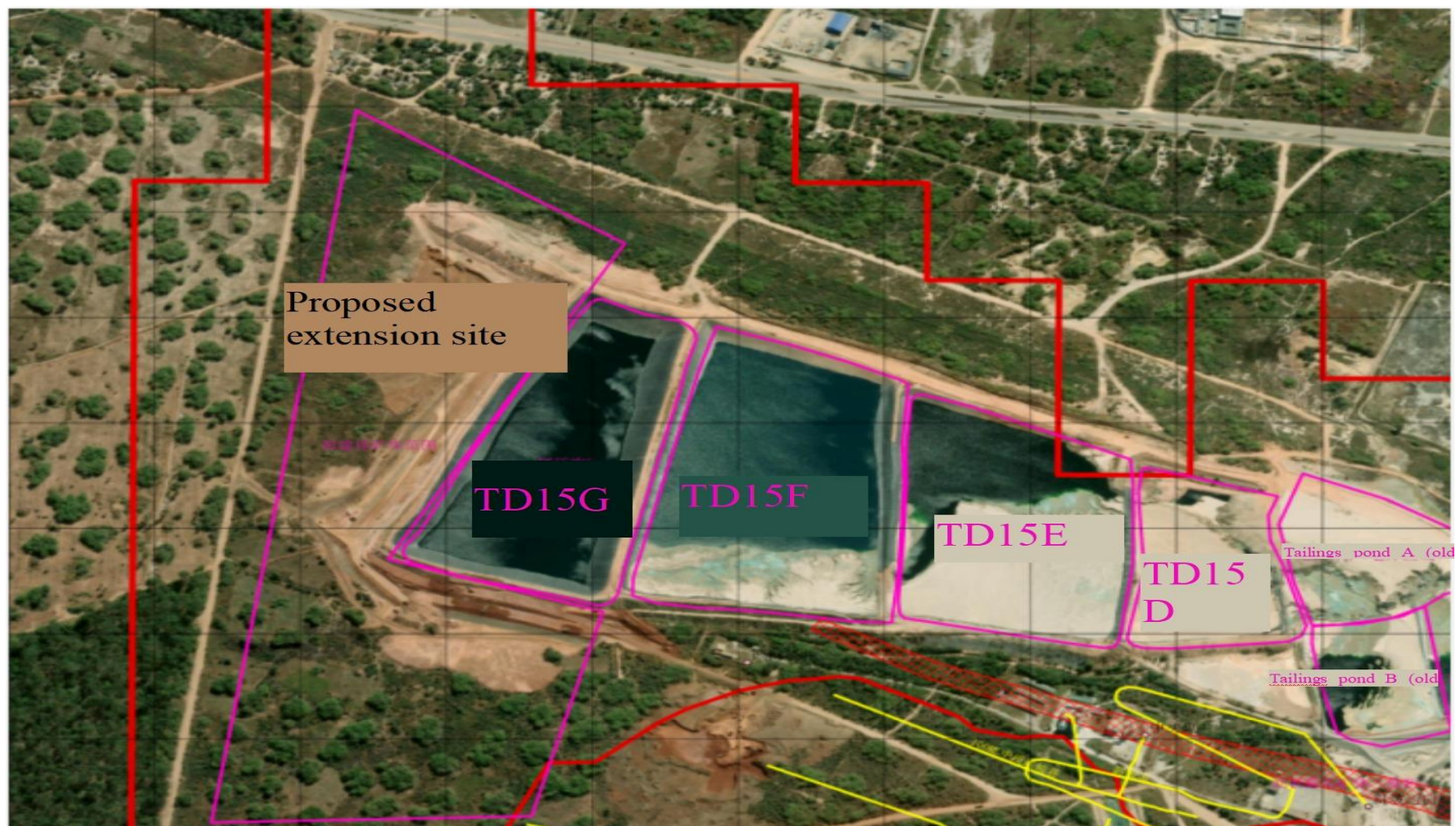
11/2/2031
Date of Expiry


Board Secretary

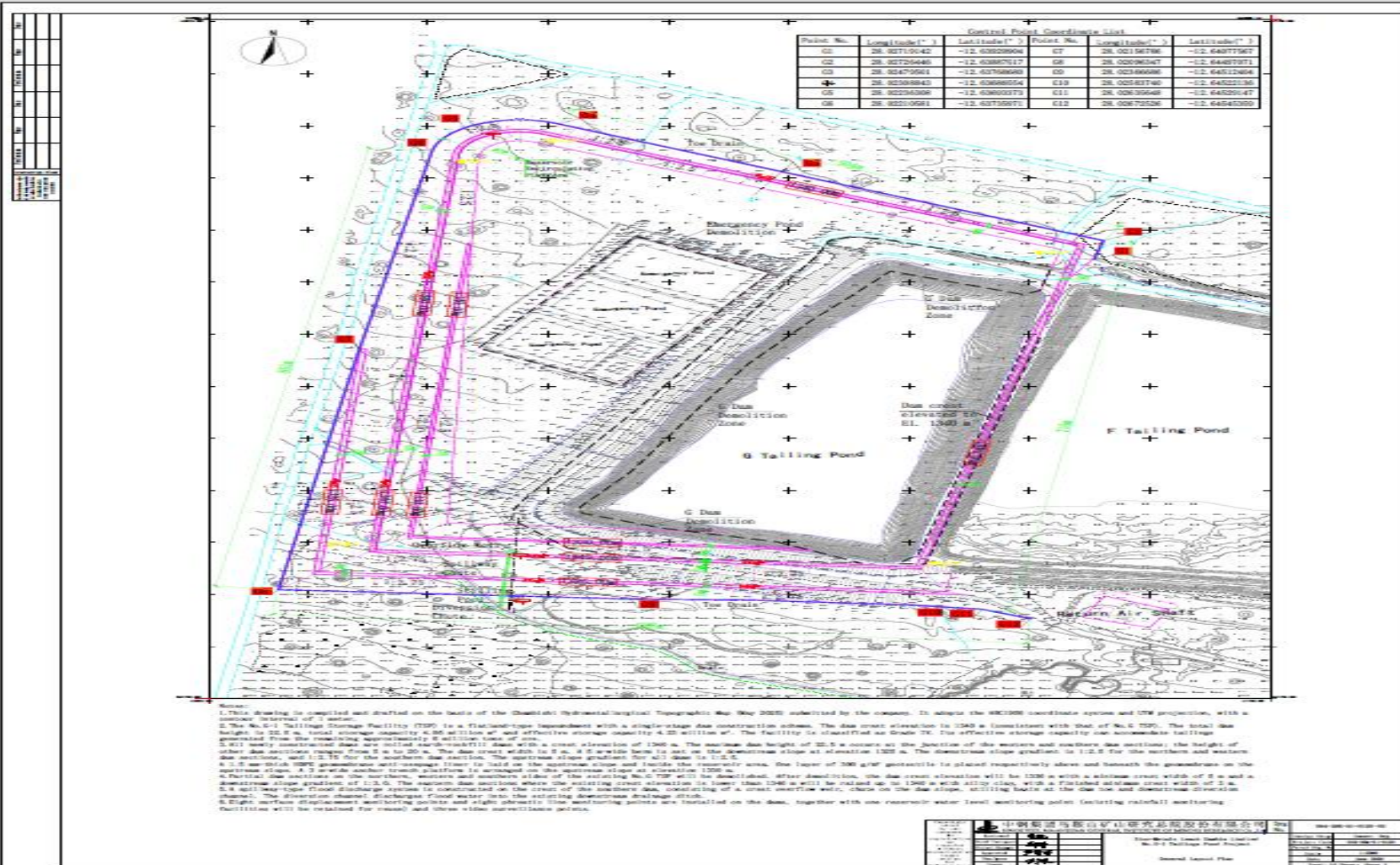



Director General

12.15 APPENDIX 9: PROPOSED PROJECT SITE



12.16 APPENDIX 10: PROPOSED TD15G-1 DESIGN DRAWING



12.17 APPENDIX 11: Project Site photos and nearby landmark





12.18 Appendix 12: CV of Specialists

Beauty Banda, MSc
 +260 978644649
 beauty.masayabanda@gmail.com
<https://www.linkedin.com/in/beauty-banda-a631a3203>

Professional Summary

A dedicated academic with over seven years' experience in environmental engineering, sustainability, and experienced in lecturing, curriculum development, research, and student mentorship. Passionate about advancing green energy, sustainable practices, and practical environmental education.

Experience

Lecturer (Environmental Engineering Department)

The Copperbelt University, Kitwe, Zambia
 November 2021 to Present

- **Effective Teaching:** Achieved over an 80% pass rate in Remote Sensing and GIS for Environmental Engineering students by employing various teaching methods and support materials.
- **Curriculum Development:** Developed and continuously improved course materials, ensuring alignment with industry standards and student needs.
- **Practical Engagement:** Organized and led educational trips to expose students to real-world environmental engineering challenges and solutions.
- **Research Supervision:** Guided students in their research projects, helping them develop strong analytical and problem-solving skills.
- **Community Projects:** Participated in local environmental projects, fostering a practical learning environment for students.

Lecturer (Engineering Department)

Mulungushi University, Kabwe, Zambia
 March 2023 to Present

- **Innovative Teaching:** Delivered courses using the latest educational technologies, resulting in high learner achievement and positive feedback.

- **Comprehensive Instruction:** Taught Water Pollution, Solid Waste Management, and Water Quality, ensuring students gain a thorough understanding of environmental engineering principles.
- **Student Engagement:** Facilitated interactive classes and discussions, encouraging active student participation and critical thinking.
- **Course Coordination:** Coordinated with other faculty members to ensure a cohesive and comprehensive learning experience for students.

Rapporteur

Faecal Sludge Management Alliance (FSMA)

June 2021 to December 2021

- **Detailed Documentation:** Meticulously documented essential details for each presentation, including the speaker's name, title, organization, and key points.
- **Publication and Audience Engagement:** Compiled and submitted a final, formatted summary report, ensuring accessible and comprehensive dissemination of the meeting outcomes.

Researcher

Africa Centre of Excellence for Water Management, Addis Ababa University

2020 to 2021

- **Research Design and Optimization:** Utilized Design Expert Software to design and optimize experiments for studying vermicomposting as an effective approach to municipal sewage sludge management.
- **Data Visualization and Interpretation:** Created detailed result tables and graphs using both Excel and Design Expert Software to clearly present and interpret research findings.
- **Successful Publication:** Published research findings in the peer-reviewed journal *Water Science and Technology* under the International Water Association.

Researcher

Copperbelt University

2017 to 2018

- **Community Engagement and Stakeholder Collaboration:** Partnered with Nkana Water and Sanitation Company and the city council to address water distribution challenges in Chipata compound.
- **Systematic Data Collection:** Sampled 190 households using a random systematic approach, ensuring a representative sample for accurate data analysis.
- **Data Analysis and Visualization:** Analyzed survey data using SPSS software, identifying trends and correlations to support evidence-based decision-making.

- **Focus Group Discussions:** Conducted discussions with community leaders and members to integrate community needs into water and sanitation projects.

Environmental Intern

Luanshya Municipal Council, Luanshya

2015 to 2017

- **Water Quality Assurance:** Collected and tested water samples for physical, chemical, and microbial parameters to ensure safe drinking water.
- **Solid Waste Management:** Implemented proper waste management practices, contributing to a cleaner and healthier environment.
- **Public Health Inspection:** Inspected public utilities to ensure compliance with health guidelines, safeguarding community health and well-being.

Education

- **Doctorate of Philosophy candidate in Renewable Energy,** University of Zambia
- **Master of Science in Water Management,** Addis Ababa University, Addis Ababa, Ethiopia
- **Bachelor of Engineering in Environmental Engineering,** Copperbelt University, Kitwe, Zambia

Licenses & Certifications

- **Teaching Methodology and Quality Assurance,** Copperbelt University
- **Gender and Integrated Water Resources Management,** Cap-Net UNDP
- **Introduction to Faecal Sludge Management,** Coursera
- **Remote Sensing and GIS in Hydrology and Water Resources Management,** Africa Center of Excellence for Water Management (ACEWM)

Skills

- **Geographical Data Management:** Proficient in ArcGIS and QGIS for spatial data analysis and mapping.

- **Statistical Software Proficiency:** Skilled in SPSS, Minitab, and Design Expert for data analysis and research optimization.
 - **Advanced MATLAB Knowledge:** Capable of performing complex mathematical modeling and simulations.
 - **Microsoft Office Proficiency:** Experienced in using Word, Excel, PowerPoint, Outlook for documentation, data analysis, and presentations.
-

Languages

- Fluent in English and local languages
-

References

1. **Associate Professor Beteley. T. Meshesha** Deputy Director, Africa Center of Excellence for Water Management (ACEWM), Addis Abba University, Ethiopia.
Email: beteley.tekola@aau.edu.et
2. **Dr. Cuthbert Makondo** Environmental Engineering, The Copperbelt University, Kitwe, Zambia. Email: cuthbert.makondo@cbu.ac.zm. Cell: (+260) 763666532.
3. **Mr. Greyard Tembo** Head of Engineering Department, Mulungushi University, Kabwe, Zambia. Email: gtembo@mu.ac.zm Cell: (+260) 971679159.



📍 10101, Ndola Zambia

📞 +260 966 590484

✉ chabatoto@gmail.com

SUMMARY

With a robust background at the Zambia Environmental Management Agency, I excel in environmental management and leadership, showcasing expertise in regulatory compliance and project management. Leveraging skills in GIS and strategic planning, I've led significant compliance audits and EIA reviews, enhancing operational efficiency and stakeholder engagement.

Dynamic Metallurgical and Mineral Processing Engineer and Environmental Practitioner with the following abilities and skills: Mining and Mineral Processing, Mineral Economics, Metallurgical Accounting, Environmental Management, Remote Sensing, and Image Analysis. Basic knowledge in GIS. Knowledge of Microsoft Word, Excel, PowerPoint, etc.

Project Management, Data Management Analysis using SPSS, Cleaner Production methodologies, Strategic Planning Formulation, Analytical and problem-solving skills, Leadership and Management skills, Chemicals Management Strategies, Regulatory Impact Assessment, Good interpersonal

MOSES MUTAMBALA

EXPERIENCE

March 2025 - Current

Managing Consultant Chabatot Green Solutions & Consultants |
Ndola, Zambia

- Lead Consultant in green and sustainable projects.

March 2025 - April 2025

Process Expert Applied Science and Technology Associates |
Kalulushi, Zambia

September 2019 - February 2025

Principal Inspector - Zone 9 Zambia Environmental Management Agency | Ndola, Zambia, Zambia

- Ensured regulatory compliance for mining, forestry, health, and agricultural facilities across multiple regions.
- Conducted compliance audits for projects including NFCA South East Ore Body and Chibuluma Mines Plc.
- Monitored licensing requirements for facilities in Chambishi, Kalulushi, and Masaiti to maintain adherence.
- Evaluated compliance status of Dangote Cement Zambia Limited and other key industry players.

May 2016 - September 2019

Principal Inspector – EIA Zambia Environmental Management Agency

- Reviewed EIA documents submitted from Copperbelt, Luapula, part of Northern, and North Western Provinces.
- Conducted verification inspections for EIA documents submitted from Copperbelt, Luapula, and parts of Northern and North Western Provinces.
- Prepared for the holding of public hearings.
- Prepared profiles with proficiency.
- Preparation of Decision Letters.

January 2014 - April 2016

Principal Inspector – Livingstone Office Zambia Environmental Management Agency

- Monitored compliance with regulatory framework to ensure the licensing and regulation of mining, forestry, health and agricultural facilities in multiple regions.
- Monitored and ensured compliance with licensing requirements for diverse facilities including those related to mining, forestry, health and agriculture in multiple locations such as Choma, Monze, Namwala and Pemba.
- Condensed review of all EIA submissions for mining, forestry, health and

and presentation skills, Client management, Technical report writing, Supervisory skills.

I am a hardworking and enthusiastic team player who fulfills assignments with minimum supervision. I have 7 years of working experience in metallurgical plants, such as the Nchanga Concentrator, Nkana Concentrator, and Nkana Smelter of the former Zambia Consolidated Copper.

SKILLS

- Mining and Mineral Processing
- Mineral Economics
- Metallurgical Accounting
- Environmental Management
- Climate Change Adaptation and Mitigation
- Risk Management
- Incident Investigation
- Emergency Response
- Remote Sensing and Image Analysis
- Basic knowledge in GIS
- Knowledge of Microsoft Word, Excel, PowerPoint, etc.
- Project Management
- Data Management with SPSS
- Cleaner Production methodologies
- Strategic Planning Formulation
- Analytical and problem-solving skills
- Leadership and Management skills
- Chemicals Management Strategies
- Regulatory Impact Assessment
- Good interpersonal and presentation skills
- Client management
- Technical report writing
- Supervisory Skills

agricultural facilities across Choma to Shang'ombo.

- Conducted verification inspections on EIA documents for mining, forestry, health, and agricultural facilities in multiple locations including Choma, Monze, Namwala, Pemba, Gwembe, Sinazongwe, Kalomo, Zimba.
- Prepared for upcoming public hearings.
- Profile preparation was completed
- Prepared Decision Letters.

August 2009 - December 2013

Senior Inspector Zone 8 Zambia Environmental Management Agency

- Monitored licensing and compliance of facilities in the Copperbelt and Northwest provinces, including heavy industrial areas in Ndola and Kitwe.
- Responded to Lumwana Tailings Storage Facility incident in 2009
- Investigation of the disappearance of 20000 cubic metres of pregnant leach solution into the ground at Kansanshi Mining Plc
- Conducted compliance audits for Kansanshi Mining Plc and Lumwana Mining Company Limited.
- Reviewed EIA documents for various projects including copper mining at Sentinel Mine, extension of Muntimpa Tailings Dam, re-establishing of tailings storage facility at former TD2 site, reopening of Mimbula II Open Pit, and more.

January 2009 - July 2009

Acting Senior Inspector EIA Zambia Environmental Management Agency

- Received, planned, supervised and conducted EIA report reviews.
- Conducted verification inspections
- Prepared project profiles.
- Prepared Decision Letters.
- Coordinated and facilitated public hearings.

April 2005 - December 2008

Inspector EIA Zambia Environmental Management Agency

- Reviewed EIA documents submitted by mining, forestry, health, and agricultural facilities in Copperbelt, Luapula, and North Western Provinces.
- Conducted verification inspections for EIA documents submitted by mining, forestry, health, and agricultural facilities in Copperbelt, Luapula, and North Western Provinces.
- Conducted compliance audits for FQMOL Bwana Mkubwa Mine, KCM Konkola, Nchanga, and Nkana Integrated Business Units.
- Responded to the fire and spill incident of solvents at Nchanga Tailings Leach Plant.
- Worked with KCM Nchanga Integrated Business Unit to end the frequent Muntimpa tailings pipeline failures
- Resolved the issue of acid mist from the MCM Butondo heap leach pads
- Reviewed EIA documents for various projects such as Oil Refinery Plant in Ndola, Gold Processing Plant at Kansanshi Mining Plc, and Dredging of the Main Canal in Kabwe
- Prepared for the holding of public hearings.
- Profile preparation was completed
- Drafted decision letters for improved communication and transparency.

January 1994 - January 1999

Assistant Metallurgical Engineer ZCMM Nkana Division

- Worked as Process and Shift Controller at Nkana Concentrator.
- Supervised more than 50 people.
- Performed Process and Quality Control.
- Performed metallurgical accounting.

EDUCATION AND TRAINING

June 2004

Bachelor of Science | Mineral Sciences - Metallurgy And Mineral Processi

The University of Zambia, Lusaka

ACTIVITIES AND HONORS

- Engineering Institution of Zambia (EIZ), 008087
- Engineers Registration Board (EngRB), 002082
- International Association for Impact Assessment (IAIA), 106934

GRADUATE EDUCATION

University of Zambia, 01/1999, 01/2004, Bachelor of Mineral Science – Metallurgy and Mineral Processing with Merit, Mineral Economics and Metallurgical Accounting

DIPLOMA EDUCATION

Copperbelt University, 07/1994, 12/1995, Diploma in Mining Metallurgy, Mineral Economics and Metallurgical Accounting

ADVANCED CERTIFICATE EDUCATION

Copperbelt University, 01/1992, 06/1994, Advanced Certificate in Mining Metallurgy, Mineral Economics and Metallurgical Accounting

SECONDARY SCHOOL EDUCATION

Mungwi Technical Secondary School, 1986, 1990, School Certificate

COMMUNICATIONS SKILLS

Communicate effectively with others orally and in writing

DRIVER'S LICENSE

SADC Class B Drivers Licence, with 5 years of driving experience

REFERENCES

- Professor Kakoma Maseka, Dean - School of Mathematics and Natural Sciences, The Copperbelt University, P. O. Box 21692, KITWE, +260 977 807803/ 962861476, kkmaseka@gmail.com
- Dr. Agabu Shane, Senior Lecturer, The Copperbelt University, P. O. Box 21692, KITWE, +260 977 457 561, agabu.shane@cbu.ac.zm
- Mr. Gideon Sinkamba, Safety Health & Environmental Manager, Lubambe Copper Mine, P. O. Box 11215, CHINGOLA, +260 969 681212, gideonsinkamba@gmail.com

PROFESSIONAL ACCOMPLISHMENTS

- Strategic Planning Formulation, 2022 - Zambia Environmental Management Agency Strategic and Business Plan (SBP) 2022 to 2026, 2013 - Zambia Environmental Management Agency Strategic and Business Plan (SBP) 2014 to 2016
- Regulations and Standards Development, 2013 – The Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013, 2009 - The Environmental Management Act No. 12 of 2011

PERSONAL INFORMATION

- Health: Excellent health
- Religion: One of Jehovah's Witnesses

EDUCATION

other

LANGUAGES

1,A1

POSTGRADUATE TRAINING

- United Nations Economic Commission for Asia & the Pacific, 2022, Certificate in Building a Circular Economy
- Sustainable Minerals Institute, The University of Queensland, Australia, 02/18/2022, Certificate in Stone for Development: Work-Integrated-Learning
- Organization for the Prohibition of Chemical Weapons, 01/14/2022, Certificate in Introduction to EDIS
- Indian Institute of Remote Sensing, 08/16/2021, 09/10/2021, Certificate in Remote Sensing & Digital Image Analysis
- Environmental Protection Research & Training Institute, 04/19/2021, 04/30/2021, Certificate in Environmental Impact Assessment – Development Projects
- Geological Survey of Sweden, 09/15/2019, 10/07/2019, Certificate in Mine Water and Mine Waste Management
- The University of Zambia, Centre for ICT, 12/11/2017, 12/22/2017, Certificate in Geographical Information System (GIS)
- The University of Zambia, Centre for ICT, 12/11/2017, 12/15/2017,

- Certificate in Data Management and Analysis using SPSS
- Cabinet Office Policy Analysis Division, 11/16/2015, 11/20/2015, Certificate in Regulatory Impact Assessment
- Southern African Regional Police Chiefs Cooperation Organization (SARPCCO), Botswana Police College, 08/10/2015, 08/21/2015, Certificate in Environmental Crime Investigation
- NIPA Main Campus, 02/08/2010, 03/05/2010, Certificate in Basic Prosecutions
- Swedish Chemicals Agency, 03/2009, 11/2009, Certificate in Strategies for Chemicals Management
- Zambia Environmental Management Agency, 12/18/2007, Certificate in Environmental Monitoring and Auditing
- Zambia Environmental Management Agency, 05/02/2007, Certificate in Review of Environmental Impact Assessments (EIAs) and Environmental Management Plans (EMPs)
- Centre for Environmental Management, 11/13/2006, 11/16/2006, Certificate in Air Quality Management
- Zambia Environmental Management Agency, 05/12/2006, Certificate in Cleaner Production and Environmental Management in Industry

INTERMINISTERIAL COMMITTEE APPOINTMENTS

- Mining Licensing Committee, 10/2022, 10/2025
- External Advisory Board of the Copperbelt University Africa Centre of Excellence for Sustainable Mining, 02/2022, 12/2023
- Technical Working Committee of the Development Minerals, 2016, 2022
- National Steering Committee of the Zambia Aquaculture Enterprise Development Project, 2017, 2022
- Inter-Agency Environmental Emergency Coordinating Committee (IECC), 2007, 2012

Chanda Kabwe

Passport: ZQ006375 // **NRC:** 305647/31/1 **Nationality:** Zambian **Date of birth:** 26/11/1996 **Gender:** Male

Phone number: (+260) 974127414 **Email address:** chandabomba@gmail.com

LinkedIn: www.linkedin.com/in/engineer-kabwe-chanda-452155217

Home: 17 NYIMBA CRESCENT, KANSENSHI, NDOLA, 1010 Ndola (Zambia)

ABOUT ME

Environmental and Social Safeguards Expert

| World Bank/IFC/ZEMA Compliance | GIS & Python Data Analysis

- **World Bank/National Compliance:** Expert in E&S risk management, audits, and implementing safeguard standards for public and private sector projects.
- **EIA & Social Programs:** Extensive experience in baseline studies, comprehensive stakeholder engagement, and developing **Resettlement Action Plans (RAPs)**.
- **Technical Proficiency:** Advanced skills in **GIS, Remote Sensing, and Python-based data analysis** for robust project monitoring and reporting.
- **Corporate Reporting:** Proven ability in **ESG, EPF Audits, and Sustainability Reporting**.

WORK EXPERIENCE

Arc Enviro Consultancy Limited – Ndola, Zambia

City: Ndola | **Country:** Zambia | **Email address:** arcenviro1@gmail.com | **Name of unit or department:** Environmental and Social Impact Assessment - **Business or sector:** Other service activities

EIA Projects Manager, GIS and Remote Sensing Specialist

[22/09/2021 – Current]

- Conducting environmental baseline studies
- Conducting social economic baseline investigations in environmental and social impact assessment (ESIA) process
- Stakeholder engagement for public scoping and disclosure meetings in ESIA process
- Conducting environmental and Social safeguards audits
- Conducting environmental protection fund audits
- Hydrological modelling (GIS and Remote Sensing)
- Ecological and biodiversity assessments
- Air quality analysis
- Water quality analysis
- Sound levels analysis
- Climate change, land use land cover analysis (GIS and Remote Sensing)
- Preparing project reports; terms of reference, scoping report, environmental impact statement
- Develop and implement resettlement action plans per IFC and World Bank standard.
- Perform environmental and social safeguards auditing and compliance monitoring
- Conduct forest inventories
- Prepare Statutory and operational environmental management plans
- Designing operational and decommissioning impact matrix for risk assessment
- Training consultant in environmental health and safety standards for oil marketing companies and petroleum transporters
- Preparation of environmental emergency preparedness and response plans
- Disposal of hazardous waste and environmental emergency spill containment and remediation
- Environmental and GIS Consultant
- Mapping, digitization and interpolation of project site and parameters of interest using GIS and Remote Sensing

Copperbelt Environmental Consultancy Limited – Kitwe, Zambia

City: Kitwe | Country: Zambia

Environmental Engineer (Intern)

[08/01/2020 – 20/09/2021]

- Conducting Environmental and Social Impact Assessments
- Application of GIS and remote sensing technologies in hydrological modelling, solar siting, soil parameter analysis and general geospatial data analysis

Kasumwa Enviroconsult and General Supplies Limited – Kitwe, Zambia

City: Kitwe | Country: Zambia

Environmental Engineer (Intern)

[10/01/2019 – 03/01/2020]

- Conducting Environmental and Social Impact Assessments
- Project site mapping using GIS

EDUCATION AND TRAINING

MSc Geo Information Science and Earth Observation

The University of Zambia [08/09/2025 – Current]

Python Programming

Appbrew [20/12/2024 – Current]

Data Analysis - Microsoft Excel beginner to advanced

Office Newb [13/03/2025 – 05/05/2025]

Country: United States

Environmental Protection Fund (EPF) Auditing

Ministry of Mines and Mineral Development [29/04/2024 – 03/05/2024]

City: Ndola | Country: Zambia

Business and Entrepreneurship Development

Young African Leaders Initiative [15/09/2023 – 15/10/2023]

City: Pretoria | Country: South Africa

Environmental and Social Safeguards Audit

Kasumwa Enviroconsult and General Supplies Limited [03/07/2023 – 17/07/2023]

City: Kitwe | Country: Zambia

Work Site Safety and Work Authorisation Permit System

Total Energies [27/04/2023 – 01/05/2023]

City: Kitwe | Country: Zambia

Practical Application of GIS and Remote Sensing in the EIA process

Kasumwa Enviroconsult and General Supplies Limited [05/02/2022 – 19/02/2022]

City: Kitwe | Country: Zambia

Bachelor of Engineering in Environmental Engineering*The Copperbelt University* [10/10/2016 – 21/09/2021]

City: Kitwe | Country: Zambia

Lower and Higher Secondary School Certificates*Ministry of Education, St Clements Boys Boarding Secondary School* [10/01/2010 – 24/11/2014]

City: Mansa | Country: Zambia

SKILLS

geographic information systems / remote sensing techniques / Microsoft Office / Microsoft Excel / Microsoft Powerpoint / Microsoft Word / Public Speaking and public relations / write technical reports / apply advanced driving techniques / manage relationships with stakeholders / data analytics / project management / Critical thinking and Problem-solving / Emotional Intelligence - EQ / sales strategies / provide emergency training

LANGUAGE SKILLS**Mother tongue(s):** IChibemba**Other language(s):** English | Chichewa**PROJECTS****Ndola Viaqua Energy Limited**

- 450MW Coal Plant approved ESIA and secured ZEMA decision letter - Ndola 2025.

TAZAMA

- Pipeline extension and linkage of main pipeline to Mpika depot approved EIA and secured ZEMA decision letter - Mpika 2023

Hammington Logistics - Accidental Spill

- Successful Cleanup of 45,000L Diesel - Rufunsa District 2022

RECOMMENDATIONS**Name:** Charles Sikaona | director

Arc Enviro Consultancy Limited

Email: csikaona@gmail.com | **Phone number:** (+260) 0964127414**Name:** Sianga Donald | Senior Inspector

Zambia Environmental Management Agency

Phone number: (+260) 965711350**Name:** Dr. Chirambo Brian | lecturer/director

- Copperbelt University

- Copperbelt Environmental Consultancy Limited

Email: chirambo@yahoo.com | **Phone number:** (+260) 955685511

PERSONAL INFORMATION

Mwelwa Musosha

☎ Contact phone: +260969462820

✉ Email: musoshamwelwa@gmail.com**PROFESSIONAL SUMMARY**

Mwelwa Musosha is an Environmental and Natural Resources Management specialist with expertise in environmental and social management planning, execution and monitoring; Environmental and Social Impact Assessments (ESIA); environmental auditing; environmental education; Resettlement Action Planning (RAP); mine closure and rehabilitation; and environmental management regulatory compliance and certification.

With over 14 years of hands-on experience in environmental management in mining, Mwelwa has audited, developed and or updated Environmental Management Plans (EMPs); ESIA's and systems as well as consulted on regulatory compliance for various mines in Zambia including Kalumbila Minerals Limited; Lubambe Copper Mines; Konkola Copper Mines (KCM); Mopani Copper Mines (MCM); Chilanga Cement; Chambishi Copper Smelter (CCS); and Chibuluma Copper Mines.

Apart from working as a consultant in the extractives sector, Mwelwa has also developed ESIA's and Managed environmental and social aspects of projects for clients ranging from construction (infrastructure), energy, and agricultural.

Owing to his vast experience in the mining sector, Mwelwa has comprehensive working knowledge of laws and regulations governing environmental management in Zambia with bias towards environmental management regulations in mining including the Mines and Minerals Development Act and Mines and Minerals (Environmental) Regulations of 1997. He also has working knowledge and network with regulatory agencies such as Mines Safety Department (MSD) and Zambia Environmental Management Agency (ZEMA).

Core competences Summary

- Environmental Management Planning, Monitoring and Auditing
- Environmental and Social Impact assessments (ESIA)
- Mine closure and rehabilitation
- Environmental and social management training/awareness
- Community engagement, mobilization and sensitization
- Environmental and socioeconomic surveys
- Occupational Safety and Health Planning and execution

EDUCATION AND TRAINING

June 2022 – July 2024

Qualification: Master of Environmental Management
University of Queensland, Australia

March, 2005 – Jan, 2009

Qualification: Bachelor of Science in Forestry
Copperbelt University, Zambia

WORK EXPERIENCE

July 2024 to Present

Position: Environmental Manager

Organisation: Citizens for a Better Environment (CBE) - Zambia

Email: cbezambia@hotmail.com Phone: +260977797514

Responsibilities:

- Coordinating and Conducting Environmental and Social Impact Assessments (ESIA), Environmental and Social Management Compliance Audits, development and updating of Environmental Management Plans (EMPs) and Ecological Assessments for clients (Mainly mines); and
- Overseeing activities including preparation of budgets, project proposals and work plans for the Environmental Department.

18th Mar – 30th Dec., 2021

Position: Ecologist Advisor – Terrestrial Ecology

Organisation: United Nations Office for Project Services (UNOPS)
under the Zambia Irrigation Development Support Project (IDSP)
funded by the World Bank

Responsibilities:

- Collect, collate and compile comprehensive baseline information on the terrestrial ecosystems of 5 water dams (2 in Pemba District, 1 in Zimba District, 1 in Namwala District and 1 in Mambwe District;
- Determine the significance of terrestrial ecological impacts caused by the dams, recommending mitigation and monitoring measures; and
- Developing Biodiversity and Ecological Management Plans for all the 5 dam project sites.

November, 2015 – May,
2022

Position: Environmental Manager

Organisation: Ecoview Environmental Consultants,

Email: ecoview.enviro@gmail.com Phone: +260962034949

Responsibilities:

- Developing Environmental Management and Monitoring Systems for clients;
- Environmental Management Planning, Auditing and preparation of Environmental and Social Impact Assessments (ESIA) including Safety and Health considerations for clients;
- Community engagement, mobilization and sensitization on natural resources management, Climate Change and related issues;
- Carrying out environmental and social economic surveys; and
- Data collection and report compilation for Forest Management Planning

Curriculum Vitae

Mwelwa Musosha

Jan, 2009 – Oct 2015

Position: Environmental Coordinator

Organisation: Citizens for a Better Environment (CBE) - Zambia

Email: cbezambia@hotmail.com Phone: +260977797514**Responsibilities:**

- Conducting Environmental Management Compliance Audits in mining sector on behalf of the Government of Zambia
- Preparation and reviewing of Environmental Impact Statements (EISs), and Environmental Management Plans (EMPs);
- Preparing budgets, project proposals and work plans for the Environmental Department; and
- Managing the activities of the Environmental Department

SELECTED RELEVANT PROJECTS OR ASSIGNMENTS

Environmental and Social Management Performance Audits; EMP updates and Systems Review for Mines	
Name of the Project:	Annual Environmental Protection Fund Audits (EPF)
Client:	Konkola Copper Mines (KCM) – Kitwe, Chingola and Chililabombwe Plant sites
Years:	2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018 and 2019
Name of the Project:	Annual Environmental Protection Fund Audits (EPF)
Client:	Mopani Copper Mines (MCM) – Kitwe and Mufulira Plant sites
Years:	2011 and 2012
Name of the Project:	Annual Environmental Protection Fund Audits (EPF)
Client:	Lafarge Zambia – Chilanga Plant
Years:	2015 and 2016
Name of the Project:	Annual Environmental Protection Fund Audits (EPF)
Client:	Lubambe Copper Mines – Chililabombwe Plant site
Years:	2016
Name of the Project:	Annual Environmental Protection Fund Audits (EPF)
Client:	Kalumbila Minerals Limited – Kalumbila Plant site
Years:	2016 and 2020
Name of the Project:	Environmental and Social Management Audit
Client:	Chambishi Copper Smelter (CCS)
Years:	2013, 2014, and 2015

Environmental and Social Impact Assessments	
Name of the Project:	Kitwe-Chingola Dual Carriage Road Environmental and Social Impact Scoping Study
Locations:	Kitwe and Chingola, Zambia
Client:	Government of the Republic of Zambia
Brief Description:	Collection of baseline data on Bio-physical environment and socio-economic status of project area. Activities included: - Preparation of Scoping report, Baseline studies and Environmental Management and Monitoring Plan (EMMP) - Compilation of the EPB Reports
Name of the Project:	Environmental Project Brief for grid extension projects in sixteen sites (some of the sites are Chembe, Mpika, Shiwangandu, Kawambwa, Mungwi, Chinsali, Monze, Kasempa, Solwezi, Luampa, Kalomo, Kabwe etc)
Locations:	Various districts in Zambia
Client:	Rural Electrification Authority (REA)
Brief Description:	Preparation of EPBs and associated EMPs which included: - Preparation of Scoping report - Baseline studies - Compilation of the EPB Reports - Preparation of Environmental Management and Monitoring Plan (EMMP)
Name of the Project:	Environmental Project Briefs (EPB) for Grid Extension for thirteen districts
Locations:	Various districts in Zambia
Client:	Rural Electrification Authority
Brief Description:	Preparation of EPBs and associated EMP for all the grid extension sites which included the following activities: - Coordinating the baseline assessment - Compilation of the various EPB reports and associated EMPs
Name of the Project:	Environmental Impact Assessment for Fuel Depot
Locations:	Chipata, Zambia
Client:	Zambian Ministry of Energy (TAZAMA)
Brief Description:	Baseline data collection on socioeconomic and biophysical environment. Activities included: Designing of data collection tools and actual data collection on the bio-physical environment and Socio-economic of the area and report compilation
Name of the Project:	Mine Closure Plan Environmental & Social Impact Assessment for Bwana Mukubwa Mine
Year:	2017 (still active)
Locations:	Ndola, Zambia
Client:	First Quantum Minerals Limited (FQML) – Bwana Mukubwa Operations
Brief Description:	Assessing the environmental damage done by mining operations and proposing remedial measures for reclamation. Activities included: Designing of environmental data collection tools, actual data collection and report writing (Mine Closure Plan – environmental management, monitoring and reclamation part)
Name of the Project:	Environmental Impact Assessment for Fuel Depot
Locations:	Mansa, Zambia
Client:	Zambian Ministry of Energy and Belgravia

Brief Description:	Baseline data collection on socioeconomic and biophysical environment. Activities included: Designing of data collection tools and actual data collection on the bio-physical environment and Socio-economic of the area and report compilation
Name of the Project:	Environmental Impact Assessment for Construction of a Brewery Plant
Locations:	Solwezi, Zambia
Client:	Wezi Breweries Limited
Brief Description:	Collection of baseline data on Bio-physical environment and socioeconomics. Activities included: preparation of scoping report; Baseline studies; compilation of the EPB reports; preparation of Environmental Management and Monitoring Plan (EMMP)
Community Engagement and Training	
Name of the Project:	Community Environmental Rights in Mining Districts
Locations:	Mufulira, Ndola, Kitwe, Solwezi and Kalumbila in Zambia
Client:	Civil Society Environmental Fund (CSEF)
Brief Description:	Training of community leaders in mining communities of Mufulira, Ndola, Kitwe, Solwezi and Kalumbila on prudent environmental management and the environmental rights of citizens as enshrined in the Environmental Management Act in relation to mining
Name of the Project:	Climate Change and Community Environmental Management
Locations:	Kitwe, Zambia
Client:	Global Green Fund (GGF) and United Church of Zambia (UCZ) – Chimwemwe Congregation
Brief Description:	Training of congregants on Climate Change and environmental management at community level. Main activities included: training 120 persons in Climate Change and participatory Environmental Management; guiding in the formulation of community based environmental management groups
Name of the Project:	Beekeeping Training and Apiary Establishment
Locations:	Lufwanyama, Zambia
Client:	Global Green Fund (GGF) and Kwesha Women Group
Brief Description:	Training of communities in Beekeeping and Apiary establishment. Main activities included: training 30 persons (community members) in Beekeeping and Apiary establishment; preparation of a Beekeeping and Apiary Establishment Guide

REFERENCES

1. **Ms Belinda Zimba**, Director/Principal Consultant, Ecoview Environmental Consultants
Email: ecoview.enviro@gmail.com
Mobile Phone: +260962034949
2. **Mr. Peter Sinkamba**, Executive Director, Citizens for a Better Environment
Email: p_sinkamba@yahoo.co.uk
Mobile Phone: +260977797514/+260961817474
3. **Mr. Rooby Kasubika**, Principal Consultant, Kasumwa Enviroconsult & General Supplies Limited
Email: rooby.kasubika@gmail.com
Mobile Phone: +260979319871