ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

FOR THE PROPOSED EXPANSION AND OPERATION OF THE ELECTRONIC WASTE COLLECTION, DISMANTLING, STORAGE AND PROCESSING FACILITY

BY

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ABBREVIATIONS AND ACRONYMS

8NDP	Seventh National Development Plan
AIDS	Acquired Immune Deficiency Syndrome
AP	Affected Person
ART	Anti-Retro Viral Treatment
CBD	Central Business District
CBO	Community-Based Organizations
CFK	Crescent Future Kids (CFK) Limited
COVID-19	Coronavirus Disease of 2019
DATF	District AIDS Task Force

DDCC	District Development Coordinating Committee
EA	Environmental Assessment
EAC	Environmental Assessments Committee
ECZ	Environmental Council of Zambia.
EHPMP	Environmental Health Pollution and Mitigation Project
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EPPCA	Environmental Protection and Pollution Control Act
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan (ESMP)
EPB	Environmental Project Brief
FD	Forestry Department
FGRM	Feedback Grievance Redress Mechanism
FRA	Food Reserve Agency
GBV	Gender-Based Violence
GRM	Grievance Redress Mechanism
GRZ	Government of the Republic of Zambia
HDPE	High Density Polyethylene
HIV	Human Immunodeficiency Virus
HPLC	High Performance Liquid Chromatography
ICT	Information Communication Technology
IT	Information Technology
LDPE	Low Density Polyethylene
LWSC	Lusaka Water and Sewerage Company
MoH	Ministry of Health
MS-GC	Mass Spectrometer-Gas Chromatography
NAEP	National Environmental Action Plan
NAPSA	National Pension Scheme Authority
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
NISIR	National Institute for Scientific and Industrial Research
NPE	National Policy on Environment
PAYE	Pay As You Earn
PCN	Project Concept Note
PCU	Project Coordinating Unit
PIU	Project Implementation Unit
PP	Polypropylene
PPE	Personal Protective Equipment
RPA	Radiation Protection Authority
RTSA	Road Transport and Safety Agency
SEA	Sexual Exploitation and Abuse
SH	Sexual Harassment
SOP	Standard Operating Procedures
STD	Sexually Transmitted Diseases
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

UNCED	United Nations Conference on Environment and Development
USAID	United States Agency for International Development
VAT	Value Added Tax
WARMA	Water Resources Management Authority
WB EHGS	World Bank Environmental, Health, and Safety Guidelines
WB	World Bank
WDC	Ward Development Committees
ZABS	Zambia Bureau of Standards
ZAMPHIA	Zambia Population based HIV Impact Assessment
ZAPD	Zambia Agency for Persons with Disabilities
ZEMA	Zambia Environmental Management Agency
ZESCO	Zambia Electricity Supply Company
ZMERIP	Zambia Mining Environmental Remediation and Improvement Project
ZPPA	Zambia Public Procurement Authority

EXECUTIVE SUMMARY

The Global E-Waste Challenge

E-waste is one of the fastest growing and most hazardous waste streams worldwide. According to the United Nations (UN), in 2021, global e-waste generation reached 57.4 million tons, with each person producing an average of 7.6 kg of electronic waste. However, only 17.4% of this waste was officially recorded as properly collected and recycled. The Global E-Waste Monitor 2024 reported that by 2022, e-waste generation had risen to 62 million tons (7.8 kg per capita), with only 22.3% documented as properly recycled. This growing discrepancy highlights a critical need for more effective waste management strategies worldwide.

E-waste contains valuable materials such as gold, copper, cobalt, and rare earth elements, but improper handling results in significant resource loss and environmental degradation. The United Nations Environment Programme (UNEP) estimated that 60-90% of the world's e-waste, worth nearly USD 19 billion, is illegally traded or dumped each year. Additionally, hazardous substances like lead, mercury, cadmium, and brominated flame retardants pose severe health risks, leading to cancers, neurological disorders, and environmental contamination.

The global response to the e-waste crisis includes circular economy models, better recycling infrastructure, and stricter regulations. However, many developing countries, including Zambia, lack the necessary infrastructure, policies, and awareness programs to manage e-waste effectively.

The E-Waste Situation in Zambia

E-waste in Zambia is a growing concern due to the rapid adoption of electronic devices such as smartphones, computers, and household appliances. A 2019 report by the Zambia Environmental Management Agency (ZEMA) highlighted a significant rise in e-waste volumes, largely due to the widespread use of electronics and the importation of second-hand electronic goods (**ZEMA Report, 2019**). However, the country lacks adequate infrastructure and regulatory frameworks for effective e-waste disposal, resulting in environmental and health hazards.

Improper e-waste disposal, including informal recycling and uncontrolled landfill dumping, releases hazardous substances such as lead, cadmium, and mercury, endangering communities and ecosystems. Additionally, Zambia's lack of comprehensive e-waste statistics—as identified in the Auditor General's Report—hinders the development of effective policies (Parliamentary Committee Report). The absence of importation standards for electronic goods further contributes to increasing e-waste volumes.

E-waste mismanagement in Zambia has led to:

- Toxic pollution due to informal e-waste handling (e.g., open-air burning and acid baths).
- Health risks from exposure to heavy metals and hazardous chemicals.
- Loss of valuable materials that could be recovered and reintegrated into the economy.

The CFK E-Waste Management Initiative

Crescent Future Kids (CFK) Limited is undertaking a strategic expansion of its e-waste management operations to address Zambia's growing e-waste challenge. This initiative aligns with the Environmental Health and Pollution Management Programme (EHPMP) framework, supporting national and international commitments to environmental sustainability, pollution control, and public

health protection. The project focuses on modernizing e-waste processing by integrating more advanced and efficient recycling technologies, without requiring new construction.
With financial backing from the **Global Environment Facility (GEF)** through the **World Bank**, CFK's e-waste management initiative is centered on:

- Reducing exposure to hazardous pollutants through the adoption of cleaner and more advanced recycling technologies.
- Enhancing institutional capacity by introducing automated sorting, material recovery, and safer dismantling processes.
- Strengthening regulatory compliance by aligning with ZEMA guidelines, international e-waste management protocols, and occupational health and safety standards.
- Promoting sustainable e-waste management practices by supporting eco-friendly material recovery, community awareness campaigns, and stakeholder partnerships.

Company Background
Crescent Future Kids (CFK) Limited, headquartered at Plot 687/7, Los Angeles Road, Lusaka, Zambia, is a leading organization dedicated to providing innovative and sustainable waste management solutions. Since its inception in the year 2003, registered as a business name and later incorporated as a Limited Company in 2006, CFK has focused on addressing the growing challenge of electronic waste (e-waste) in Zambia through eco-friendly recycling practices and resource recovery initiatives. Guided by its mission to promote environmental stewardship, CFK has established itself as a trusted name in the waste management sector.

Over the years, CFK has successfully implemented numerous Projects aimed at reducing e-waste pollution while contributing to Zambia's green economy. Through strategic partnerships and adherence to international environmental standards, the company has consistently demonstrated its commitment to sustainability, public health, and regulatory compliance.

This proposed expansion of the e-waste recycling facility in Makeni, Lusaka, represents a pivotal step in CFK's journey toward scaling up its operations. By incorporating advanced technology and increasing its processing capacity, CFK aims to establish a benchmark for best practices in e-waste management, significantly contributing to environmental protection and sustainable development in Zambia.

Project Background
Crescent Future Kids (CFK) Limited is committed to providing sustainable waste management solutions, particularly in dealing with electronic waste (e-waste) in Lusaka. Currently, CFK operates an e-waste management facility focused on eco-friendly disposal and recycling of electronic waste. To scale up operations and improve efficiency, CFK plans to expansion its existing facility in Makeni, Lusaka, by introducing new machinery, tools, and equipment. The expansion will enhance the capacity of the facility to process more e-waste and ensure the sustainable disposal of materials like cell phones, computers, as well as various domestic electrical and electronic components.

The new Project aims to establish a model of best practices in electronic waste recycling, which is an essential service in Zambia, where e-waste is growing rapidly.

Project Rationale

Lusaka, like many urban areas, faces growing challenges related to waste management, particularly with the increasing volume of e-waste. This specific waste stream has not been fully attended to and leaves an eyesore in the various waste streams of the country. Electronic waste contains hazardous materials like lead, mercury, and cadmium, which pose significant environmental risks. CFK's expansion will significantly improve the recycling of e-waste in the region, reduce pollution, and create economic opportunities for vulnerable communities.

By upgrading the processing facility, CFK aims to introduce modern machinery and technology to improve the efficiency of its operations, reduce harmful emissions, and increase recycling rates. The expansion will directly contribute to the local economy through job creation, tax revenues, and community outreach efforts.

Project Objectives

The main objective of this expansion is to improve the capacity and efficiency of CFK's electronic waste processing facility. Specifically, the Project will:

1. Increase the capacity to collect, dismantle, treat and recycle e-waste.
2. Introduce advanced machinery and technology for more efficient processing.
3. Provide employment opportunities for women, youth, and vulnerable community members thereby improving our staffing and processing efficiency capacity.
4. Enhance awareness about responsible e-waste disposal and environmental health.
5. Reduce the amount of e-waste that ends up in landfills, contributing to a cleaner environment.

The Environmental and Social Management Plan (ESMP) has been developed to identify, assess, and mitigate environmental and social risks associated with the installation and operational phases of CFK's upgraded e-waste facility. Unlike conventional projects requiring major construction, CFK's approach focuses on facility enhancement through the acquisition and installation of advanced e-waste processing equipment, minimizing physical site disturbance while maximizing environmental performance.

To set up and operate the facility no infrastructure construction is foreseen but only the installation of the recycling equipment. Therefore, a summary of E&S risks associated with the installation and operation of the plant is indicated below:

Summary of Environmental Social Risks, and impacts with Mitigation Measures

RISKS/IMPACT	MITIGATION MEASURES
PRE-INSTALLATION PHASE	
Regulatory compliance and permitting issues & delays	• Develop a comprehensive permitting strategy early. • Identify all required permits, timelines, and approvals. • Engage regulatory bodies like ZEMA and local authorities. • Maintain all documentation related to permits and approvals.
Inadequate project planning	• Develop a comprehensive project plan covering all processes. • Use structured project planning tools such as project charters, governance frameworks, and defined roles & responsibilities.
Inadequate stakeholder engagement	• Develop and implement a stakeholder engagement plan focusing on inclusive engagement (especially vulnerable groups). • Establish transparent grievance redress mechanisms. • Conduct community sensitization campaigns on e-waste disposal and project activities.
Disruption in procurement	• Establish relationships with multiple suppliers. • Use readily available substitute materials that meet specifications.
Unforeseen challenges (labour shortages, weather, permitting delays, etc.)	• Conduct thorough risk assessment. • Develop proactive mitigation and contingency plans. • Ensure flexibility in procurement and workforce management.
Procurement of less energy-efficient equipment leading to high energy demand	• Ensure procurement of energy-efficient equipment. • Consider alternative energy sources (e.g., solar) to improve sustainability and reduce operational costs.
Procurement of high-power equipment causing noise and vibration	• Procure equipment fitted with acoustic dampers and anti-vibration materials. • Install noise barriers in high-impact areas. • Schedule noisy activities for daytime hours to minimize community impact.
Procurement of unsafe machinery with no safeguards (e.g., exposed rotating parts, sharp edges)	• Ensure all equipment has built-in safety features such as machine guards. • Conduct safety audits before installation. • Implement occupational health & safety (OHS) protocols, including mandatory use of PPE.
INSTALLATION PHASE	
Air pollution due to equipment calibration and setup activities	• Use dust suppression techniques during installation. • Install air pollution control systems like filters and scrubbers. • Conduct operations in enclosed areas when possible.
Occupational health & safety risks (e.g., injuries from machinery during installation)	• Provide proper training for workers handling equipment. • Implement strict safety protocols and supervision. • Ensure the use of PPE (helmets, gloves, safety boots, eye protection). • Conduct regular site inspections and hazard monitoring.
Temporary waste generation from old machinery decommissioning	• Implement a waste segregation and recycling program. • Ensure proper disposal of hazardous components. • Maximize material reuse where possible.
Soil or water contamination from equipment maintenance fluids	• Use spill-proof maintenance techniques. • Store and dispose of used oil and chemicals safely in designated containers. • Install secondary containment systems to prevent leaks.
OPERATIONAL AND MAINTENANCE PHASE	
Air emissions from shredding, smelting, and material separation	• Install advanced air filtration systems and electrostatic precipitators.

	• Regularly monitor air quality for compliance with environmental regulations. • Enforce strict waste handling protocols to minimize emissions.
Fire hazards associated with lithium-ion battery recycling and electrical failures	• Install fire detection and suppression systems in battery storage and processing areas. • Train employees on emergency response and fire safety procedures. • Use thermal monitoring systems to detect overheating early.
Contamination of air, soil, and water resources during dismantling of e-waste	• Ensure dismantling processes are dry processes to prevent leachate formation. • Implement impermeable storage surfaces and bunded areas. • Train personnel on hazardous waste handling and disposal. • Conduct regular environmental compliance audits.
Potential contamination of water resources due to improper waste handling	• Develop strict waste handling protocols, including secondary containment measures. • Implement wastewater treatment systems. • Establish a real-time environmental monitoring system to detect contamination early.
Risks related to sexual exploitation and abuse (SEA) and sexual harassment (SH)	• Implement a Code of Conduct with strict policies on SEA and SH. • Provide gender-sensitive training for workers. • Establish confidential reporting mechanisms and ensure disciplinary actions for violations.
Reduced road safety & traffic congestion due to e-waste transportation	• Develop a transport and road safety policy. • Train drivers on defensive driving techniques. • Schedule e-waste transportation during off-peak hours. • Establish clear road safety signage and enforce compliance with traffic regulations.
Possible heavy metal contamination from e-waste processing	• Conduct dismantling in enclosed, ventilated areas. • Use bioremediation or encapsulation for heavy metal stabilization. • Provide workers with proper PPE (respirators, gloves, safety boots).
Soil and water contamination from hazardous waste leaks	• Store chemicals in labelled, non-leaking containers with secondary containment systems. • Install a leachate collection and treatment system. • Regularly test groundwater for contamination and take corrective action if needed. • Conduct stakeholder engagement on safe waste management.
Power outages and instability affecting operations	• Procure energy-efficient equipment. • Integrate alternative energy sources such as solar. • Develop contingency plans for power disruptions.
Elevated noise levels affecting workers and the community	• Install noise barriers and soundproofing materials in noisy areas. • Regularly maintain and lubricate equipment to reduce noise. • Establish buffer zones around the facility. • Monitor noise levels and engage with communities on concerns.
Unintentional release of Unintentional Persistent Organic Pollutants (uPOPs)	• Implement Best Available Techniques (BAT) to optimize processing conditions and minimize high-temperature reactions that lead to uPOPs formation. • Apply Best Environmental Practices (BEP) to manage combustion conditions, temperature profiles, and residence times to prevent incomplete combustion.

	• Equip the facility with high-efficiency air pollution control devices such as fabric filters, activated carbon injection, and wet scrubbers, aligning with BAT/BEP guidance. • Ensure regular maintenance and upgrades of air pollution control systems to maintain effectiveness. • Implement a continuous emissions monitoring system (CEMS) to track dioxin, furan, and particulate emissions. • Use data-driven insights from CEMS to fine-tune operational parameters in line with UNEP guidelines on reducing uPOPs emissions. • Adopt measures outlined in the UNEP uPOPs Framework to guide best practices. • Work towards compliance with IFC Environmental, Health, and Safety (EHS) Guidelines, ensuring that BAT/BEP principles are integrated into daily operations.
Reduced ambient air quality due to e-waste operations	• Use air pollution abatement equipment like scrubbers and filters to remove pollutants before release. • Conduct e-waste operations in enclosed areas and implement dust suppression techniques. • Prohibit open burning of e-waste and ensure proper storage to prevent pollutant release. • Provide safe dismantling methods and PPE for workers, with health and safety training. • Ensure compliance with air quality regulations and conduct regular monitoring and training.
Poor Solid Waste Management	• • Implement a waste management plan. • Use designated bins and engage licensed waste collectors. • Promote recycling and responsible disposal of e-waste materials.
Failure to Comply with Labour and Occupational Health & Safety Laws and Regulations	• • Ensure compliance with labour practices and working conditions through periodic checks by the Project PIU. • Implement labour management procedures to guarantee signed contracts with clear working conditions for all workers. • Adopt non-discriminatory labour practices, including recruitment, promotion, and dismissal processes. • Prevent child and forced labour by adhering to national and international laws, verifying worker documentation, and ensuring voluntary and fair engagement of workers. • Establish and maintain a transparent grievance redress mechanism (GRM) for workers and nearby communities, with periodic sensitization. • Ensure safety and health standards are met by identifying hazards, providing corrective measures, training workers, documenting incidents, and maintaining emergency response arrangements.
Unfair Employment	• Implement Labour Management Procedures (LMP) to provide fair employment opportunities. • Establish an accessible worker GRM. • Periodically sensitize workers and ensure minimum age requirements to prevent forced labour and child labour.
GBV / SEA / SH (Gender-Based Violence / Sexual Exploitation and Abuse / Sexual Harassment)	• Establish and implement an accessible and transparent worker GRM with periodic sensitization. • Sensitize workers and the community on GBV/SEA/SH issues. • Introduce a code of conduct for workers, ensuring all workers sign and adhere to it.

Risk of Disease Exposure and Transmission	• Sensitize workers and the community on health impacts of exposure to e-waste, including the route of exposure and protection measures.
Inadequate Stakeholder Engagement	• Establish open and transparent communication channels with all stakeholders. • Ensure the GRM effectively addresses any concerns or complaints arising during operations. • Raise awareness among the local community about both positive and negative impacts of the project. • Encourage responsible e-waste management practices to maintain a clean and healthy environment.
Equipment-Related Injuries	• Install safety guards and emergency stop buttons. • Conduct regular maintenance and inspections. • Train workers on safe equipment operation. • Ensure the presence of displayed operational equipment instructions and manuals. • Supervise and monitor the implementation of equipment safety instructions.
Fire Hazards	• Develop and display fire emergency response procedures. • Install and regularly inspect fire detection and suppression systems. • Store flammable materials safely, away from ignition sources. • Conduct comprehensive fire drills and training for staff. • Ensure the use of fire-resistant materials and obtain necessary fire certifications. • Implement measures to control combustible dust and conduct regular inspections. • Promote a health and safety culture, encouraging vigilance and adherence to protocols.
Ergonomic Hazards	• Use mechanical aids and rotate tasks • Provide training on lifting techniques • Design ergonomic workstations • Ensure short-term resting breaks are implemented
Occupation health and safety risks including worker injuries poor working conditions	• Provide PPE like gloves, safety shoes, helmets • Conduct health and safety training • Develop and implement a Hazardous Materials Management Plan: • Identify and assess the hazardous materials present in the e-waste streams. • Implement proper handling, storage, and disposal procedures for hazardous materials. • Provide specialized training and PPE for workers handling hazardous materials. • Establish emergency response plans and procedures for spills or accidents involving hazardous materials. • Implement Occupational Health and Safety Management System: • Establish an OHS management system aligned with international standards (e.g., ISO 45001) ESS2 including EHS guidelines and national regulations on labour an OHS. • Conduct regular workplace inspections, risk assessments, and hazard identification activities and develop safe systems of work • Provide appropriate PPE, safety equipment, and training to workers based on their job roles and exposure risks.

	• Implement a medical surveillance program for workers exposed to hazardous materials or conditions. • Install emergency facilities and proper safety signage
Delays in collection of PCBs and other extracted e-waste parts	• Secure legally binding MoU with advanced e-waste facilities • Sign mutual contracts to ensure timely pick-up and delivery • Adhere to the Basel convention guidelines • Have valid permits and ensure timely renewal including the hazardous license for transportation, storage, handling and pre-treatment of e-waste.
DECOMMISSIONING PHASE	
Reduced Road Safety	• Use proper road signs for traffic guidance. • Set and enforce speed limits for project vehicles. • Train drivers on safe driving practices and defensive driving.
Unfair employment	• Implement Labour Management Procedures (LMP) to provide fair employment opportunities • Establish accessible worker GRM, and • Periodically sensitize workers and ensure minimum age for employment in preventing forced labour and child labour
Risk of Disease Transmission	• Sensitize workers and community on health impacts
Reduced Ambient Air Quality	• Provide appropriate PPE • Suppress dust emissions with water
Elevated Nosie Levels	• Provide suitable PPE like earmuffs/plugs • Monitor and limit noise levels • Limit operation hours to daytime • Short duration of activities
Soil, Ground, and Water Contamination	• Use non-leaking containers for hazardous chemicals. • Store and handle oil and hazardous substances safely. • Train personnel in proper chemical handling, storage, and disposal procedures. • Implement spill response measures and containment systems to prevent contamination.

CFK management is committed to the effective implementation and monitoring of the Environmental and Social Management Plan (ESMP) throughout the project lifecycle. The ESMP ensures the minimization of negative environmental and social impacts while enhancing positive outcomes, promoting sustainability, and ensuring continuous stakeholder engagement.

Integrated Environmental & Social Safeguards

The ESMP emphasizes key safeguards across all project phases, including:

- **Community Engagement & Awareness:** Conducting sensitization campaigns to promote responsible e-waste disposal and encourage community participation.
- **Regulatory Compliance & Environmental Safeguards:** Ensuring adherence to ZEMA regulations, ISO 14001 standards, and Basel Convention guidelines on hazardous waste disposal.
- **Occupational Health & Safety (OHS) Enhancement:** Implementing PPE protocols, ventilation systems, and automated hazard monitoring for worker safety.
- **Fire Prevention & Emergency Response:** Installing fire detection and suppression systems, particularly in battery storage areas.

- **Wastewater & Air Pollution Controls:** Upgrading to high-efficiency filtration systems, electrostatic precipitators, and wastewater treatment units.
- **Regular Monitoring & Compliance Audits:** Establishing a real-time environmental monitoring system to track emissions, waste levels, and workplace safety.

Implementation Approach

The ESMP was developed using a robust, evidence-based approach, integrating:

- **Desk Reviews** of environmental legislation, World Bank Environmental and Social Standards (ESSs), Environmental Health and Safety Guidelines (EHSGs), and Good International Industry Practices (GIIPs).
- **On-Site Assessments** to evaluate the facility's operational capacity, environmental impact, and necessary infrastructure upgrades.
- **Stakeholder Consultations** with key institutions including ZEMA, ZICTA, the Ministry of Green Economy and Environment, and the Zambia Revenue Authority (ZRA).

Commitment to Compliance & Sustainability

CFK is dedicated to meeting national and international environmental and social obligations by ensuring:

- Alignment with international best practices in environmental and social sustainability**.**
- Transparent and accountable stakeholder engagement to enhance participation.
- Strict adherence to environmental regulations to protect ecosystems and communities.

To ensure the successful execution of the CFK E-Waste Project, it is recommended that:

- A **phased implementation plan** be adopted to gradually integrate new equipment while maintaining operational efficiency.
- A **workforce training program** be developed to equip employees with skills in handling advanced recycling technologies.
- A **compliance and monitoring framework** be established to track the environmental and social impact of the facility's upgraded operations.
- A **partnership model** be explored to collaborate with government agencies, academia, and the private sector for sustainable e-waste solutions.

This expansion represents a major step forward in Zambia's e-waste management landscape, offering a scalable, replicable, and environmentally responsible approach to e-waste recycling. By implementing this plan, CFK aims to enhance public health, protect the environment, and contribute to sustainable economic development in Zambia.

Summary Description of the Project

The Crescent Future Kids (CFK) Limited Project, supported under the Environmental Health and Pollution Management Programme (EHPMP), is focused on addressing Zambia's growing e-waste management challenges. The Project seeks to establish a sustainable e-waste management facility designed to promote safe and environmentally sound recycling practices. This initiative aligns with national development priorities and international environmental management standards.

The Project is necessitated by Zambia's rapid growth in Information and Communication Technology (ICT), which has led to increased use of electronic devices such as computers, smartphones, and household appliances. However, the lack of adequate infrastructure and systems for e-waste management has resulted in improper disposal practices, including the use of informal recycling facilities and landfills. These practices contribute to the release of hazardous substances into the environment, posing significant health and ecological risks.

The CFK Project will focus on the upgrade of the existing and operationalization of a modern e-waste recycling facility equipped with advanced technologies for the safe collection, handling, and recycling of discarded electronic devices. The facility will process various types of e-waste, minimizing harmful environmental impacts while recovering valuable materials for reuse in industrial processes. Additionally, the Project will incorporate measures to mitigate associated risks, such as occupational health and safety (OHS) risks, air and water pollution, and potential social risks like sexual exploitation and abuse (SEA) and sexual harassment (SH). The Project also emphasizes stakeholder engagement and capacity building to enhance institutional frameworks and awareness of proper e-waste management. Through strategic partnerships and compliance with environmental and social standards, the CFK Project aims to create a replicable model for sustainable waste management practices in Zambia, contributing to improved public health, environmental sustainability, and economic opportunities in local communities

1.0 INTRODUCTION

1.1 Background

Crescent Future Kids Limited is an ICT company based in Zambia, specializing in electronic waste (e-waste) management. The company is recognized by the Zambia Environmental Management Agency (ZEMA) for its responsible handling and disposal of e-waste. As part of its expansion plans, the company intends to extend its operations by expanding its e-waste management plant located on farm no. 687 in Makeni, Lusaka.

The plant will be fully equipped with necessary infrastructure such as crushers, fire protection systems, and component isolation points. The proposed site, covering 2,600m², is located off Los Angeles Road in Makeni, Lusaka, with GPS coordinates: 35L0631637 UTM 8291848. The site is approximately 7 km from the Lumumba-Los Angeles Road turn-off and is accessible by road.

The existing site includes several structures, including a house which houses the CFK Offices, an operational warehouse, a borehole with installed tank, old electronic waste storage houses and a boundary wall with surrounding vegetation. The expansion will involve upgrading the existing facilities to comply with relevant Zambian standards and regulations set by the Energy Regulation Board of Zambia.

1.2 Directors and Shareholders

The shareholding structure of Crescent Future Kids Limited is as follows:

Table 1: Directors and Shareholders

Name	Shares	Nationality	Address
Ephraim Simukonde	3,250,000	Zambian	Plot No 6/687, Pelikan Road, Makeni, Lusaka, Zambia
Gift Simukonde	250,000	Zambian	Plot No 6/687, Pelikan Road, Makeni, Lusaka, Zambia

1.3 Developer's Contact Details

Contact Person	**Mr. Emmanuel Alpha Muwowo**
Designation	Project Manager / Managing Director
Physical Address	Plot 687/7 Los Angeles Road, Lusaka
Postal Address	P.O Box 380182, Lusaka, Zambia
Telephone	+260 977 200 722
Email	alpha@cfkz.org / inquiries@cfkz.org

1.4 Experience and Track Record

Crescent Future Kids Limited has over 20 years of experience in the ICT sector in Zambia. The company was the first provider of computer centers for government schools, providing computers and training to schools and colleges on behalf of the government. Recognizing the growing issue of e-waste, Crescent Future Kids Limited pioneered the management of electronic waste in Zambia in 2008. The company played a key role as the main contractor in the ZICTA Procurement, Delivery, Installation, and Commissioning of Computer Laboratories in 150 government schools, implementing the Thin Client Solution. Additionally, Crescent Future Kids has accumulated a stable and extensive clientele, including

major companies like Copperbelt Energy Corporation (CEC), Konkola Copper Mines (KCM), Camara Zambia, WEEE Centre Kenya, Citibank Zambia, First Alliance Bank, Centre for Infectious Disease Research in Zambia (CIDRZ), and Japan International Cooperation Agency (JICA). Crescent Future Kids is recognized as a pioneer in the field, having been involved in e-waste operations since 2008, prior to the introduction of e-waste licensing by ZEMA. The company has been consulted in the formulation of the licensing process and has worked extensively in managing and recycling electronic waste.

1.5 Purpose and Objectives of the Environmental and Social Management Plan

1.5.1 Purpose of the ESMP

This Environmental and Social Management Plan (ESMP) was developed to enhance the environmental and social risk management of the Crescent Future Kids (CFK) e-waste recovery project under the World Bank-supported EHPMP program. The Environmental and Social Management Plan (ESMP) has been developed to guide the implementation of the CFK Project under the EHPMP Grant, ensuring that it aligns with environmental sustainability principles and social inclusion. The ESMP aims to address potential risks, maximize Project benefits, and promote long-term environmental and social well-being.

1.5.2 Objectives of the ESMP

The objectives include:

1. **Establish a Comprehensive Regulatory Framework**
   To ensure that the Project aligns with national laws, policies, and international commitments by assessing applicable legal instruments, World Bank Environmental and Social Standards (ESS), Environmental, Health, and Safety Guidelines (EHSGs), and Good International Industry Practice (GIIP).

2. **Characterize the Project Environment**
   To document the environmental and social baseline conditions of the Project location, including natural resources, biodiversity, and socio-economic conditions, ensuring a detailed understanding of the existing context for informed decision-making.

3. **Evaluate Environmental and Social Risks**
   To systematically identify, assess, and categorize the Project's potential impacts both positive and negative on environmental and social systems across all Project phases, including risks to vulnerable groups and sensitive ecosystems.

4. **Define Context-Specific Mitigation Measures**
   To design tailored, actionable measures to minimize, avoid, or offset adverse environmental and social impacts, while enhancing opportunities for sustainability, efficiency, and community well-being.

5. **Ensure Resilient Project Implementation**

To promote the adoption of resource-efficient, climate-resilient, and environmentally sustainable approaches throughout the Project lifecycle, ensuring minimal disruption to natural ecosystems and social systems.

6. **Promote Health, Safety, and Well-being**
   To prioritize occupational health and safety (OHS) by identifying workplace hazards, preventing accidents, and ensuring a safe and inclusive environment for workers and communities.

7. **Facilitate Stakeholder Collaboration**
   To encourage open, inclusive, and culturally appropriate engagement with stakeholders, including local communities, government authorities, and non-governmental organizations, ensuring that their inputs inform Project design and implementation.

8. **Develop a Monitoring and Evaluation Framework**
   To establish a clear framework for ongoing environmental and social performance monitoring, ensuring that the mitigation measures are effective, and compliance is maintained throughout the Project duration.

9. **Enhance Institutional and Community Capacity**
   To strengthen the capacities of relevant institutions and local communities in environmental and social management, promoting ownership, accountability, and sustainability of the Project outcomes.

The primary objective of the Project is to expansion the existing electronic waste management plant located on farm no. 687 in Makeni, Lusaka. This expansion includes the installation of additional equipment, such as crushers and fire protection systems, to enhance the plant's capacity for e-waste management and ensure safe operations.

This **Environmental and Social Management Plan (ESMP)** is aimed at assessing the potential environmental and social impacts of the Project during both the **expansion** and **operation phases**. The key components of the ESMP include:

- Relevant legislation governing e-waste management.
- Detailed information describing the Project and its operational scope.
- A description of the Project site and its surrounding environment.
- An assessment of impacts on the environment and surrounding communities.
- The development of mitigation measures for adverse impacts.
- Risks of accidents or hazardous events that may occur during the Project.
- The environmental policy and institutional framework within which the Project will operate.
- Social impacts related to the expansion and operations.
- An Environmental and Social Monitoring Plan (ESMP) to ensure ongoing environmental compliance.
- A summary of the proposed actions and commitments.

1.6 Methodology and Approach

The Environmental and Social Management Plan (ESMP) for the Crescent Future Kids (CFK) E-Waste Recycling Plant was developed through a comprehensive methodology that included desk-based research, field visits, and stakeholder consultations. This approach ensured that the ESMP is informed by local knowledge, scientific data, and stakeholder input. The following key steps were undertaken:

1.6.1 Desk-Based Research

An extensive review of available literature, environmental legislation, and best practices in e-waste management was conducted. This included:

- Reviewing Zambia's Environmental Management Act (EMA) No. 12 of 2011 and other relevant legal and policy frameworks.
- Referencing international standards such as the World Bank Environmental, Health, and Safety Guidelines (EHSGs) for hazardous materials and waste management.
- Analysing global best practices in e-waste management to ensure the Project aligns with sustainable and safe practices.

1.6.2 Field Visits and Environmental Monitoring

Environmental monitoring was conducted to assess baseline conditions and potential impacts during Project implementation:

- **Water Quality:** Sampling of groundwater and surface water near the facility to evaluate contamination risks.
- **Soil Quality:** Collection of soil samples to detect any contamination or risks to surrounding areas.
- **Air Quality:** Measurement of air pollutants to assess the potential for dust or gaseous emissions during Project activities.

1.6.3 Stakeholder Consultations

Engagement with stakeholders ensured transparency and inclusivity in the planning process. The following stakeholders were consulted:

Local Stakeholders:

- **Local Communities:** Meetings with Twelve (12) households in the nearby proximity of the facility to understand their concerns, such as noise, pollution, and employment opportunities.
- **Ward Development Committee (WDC):** Engaged to discuss potential socio-economic impacts and gain community support for the Project. An engagement call with the Makeni Villa Ward Chairman, **Mr. Elias Chihinga,** was conducted for this consultation.
- **Local Businesses and Recyclers:** Engaged with Gemini (Teta Metals) Limited and E-Tech (TCH) Recyclers Limited to explore partnerships for processing and resale of recyclable materials.

Government Authorities:

- **Ministry of Green Economy and Environment:** Consulted to align the ESMP with Zambia's national environmental policy framework. Had an engagement call with the Principal Environment Management Officer at Ministry of Green Economy and Environment.

- **Zambia Environmental Management Agency (ZEMA):** Engaged for compliance with environmental regulations and approval of the ESMP. Visited and interacted with Environmental Safeguards Specialist EHPMP.
- **Ministry of Local Government and Rural Development:** Liaised with the Lusaka City Council (LCC) to ensure alignment with local planning and waste management by-laws.
- **Zambia Bureau of Standards (ZABS):** Consulted to ensure adherence to standards for handling, processing, and exporting hazardous materials.

International and Regional Organizations:

- **Basel Convention Regional Centre for Africa (BCRC):** Consulted for insights into regional e-waste management best practices and potential collaboration on capacity building.
- **World Bank and IFC Representatives:** Engaged to align with international best practices for hazardous materials management and environmental monitoring.
- **South African e-Waste Alliance:** Consulted for lessons on exporting hazardous components and regional collaboration in e-waste recycling.
- **Sustainable Digital Development Alliance (SDDA):** Registered as a member of the Alliance and consulted for lessons on managing and running an advanced e-waste facility as well as additional regional collaborations in e-waste recycling.

Private Sector Partners

- **Local Recycling Companies:** Collaboration with recyclers in Zambia for processing non-hazardous materials such as plastics and metals (e.g. Teta Metals, Greenstretch Consultants and E-Tech).
- **Global e-Waste Processors:** Engagement with international firms to export components that cannot be recycled locally, such as CRT glass and certain plastics (Worldloop Belgium, Umicore Belgium, Glencore, Henan Recycle China).

1.7 Estimated Cost and Start Date

The proposed expansion of the CFK e-waste facility is estimated to cost **USD580,928**. The project is set to commence **immediately upon securing all necessary regulatory approvals**, including environmental clearance, safety compliance, and installation permits. Additionally, the procurement and delivery of key equipment must be finalized before work begins.

The **Pre-Installation and Preparation and Installation Phase** is expected to span approximately **two (2) months**, during which advanced recycling machinery will be integrated into the facility, alongside critical infrastructure upgrades. This timeline includes e**quipment installation, calibration, staff training, and initial operational testing** to ensure the efficiency and safety of the upgraded systems.

By adhering to this schedule, the project aims to enhance e-waste processing capacity while maintaining compliance with environmental and occupational safety standards**.**

1.7.1 Averaging of Project Cost and Timeline

Table 2: Averaging of Project Cost

Category	Description	Amount (USD)	% of Grant
Machinery and Equipment	E-Waste processing and operational equipment	348,554.38	60%

Operational Setup	Administrative tools, training, marketing	105,895.00	18%
Project Management	Staffing, compliance, software systems	62,000.00	11%
Monitoring & Evaluation	Tools for self-monitoring and compliance	31,478.62	5%
Miscellaneous Costs	Market campaigns, workshops, minor facility modifications	33,072.00	6%
Total Grant Request	Overall grant request	580,928.00	100%

1.8 Environmental and Social Data Analysis

Collected data was analyzed to inform impact predictions and identify appropriate mitigation measures. This included:

- Assessing risks of soil and water contamination.
- Evaluating potential health and safety risks to workers and the community.
- Identifying opportunities to enhance positive socio-economic impacts, such as employment creation and skill development.

The inclusion of relevant stakeholders and robust monitoring mechanisms ensures that this ESMP is well-informed, inclusive, and actionable, providing a roadmap for sustainable e-waste management in Zambia.

1.9 Project Location

The Project site is located at **Farm No. 687, Makeni**, Lusaka, with the following coordinates: **35L0631637 UTM 8291848E**. The site is easily accessible from the central business district via Los Angeles Road, Kalusha Bwalya Road, Mumbwa Road and Makeni Road. The location includes an existing e-waste facility, warehouse and other facilities, with room for expansion.

1.9.1 Geographical Coordinates

Point	Location Coordinates
A	-15.447034344557332° S, 28.227827634826443° E

1.9.2 Landmarks:

Physical Landmark	Distance from Project Site	Latitude	Longitude
Makeni Mall	6.5 km	-15.45400532197° S	28.26620516571° E
Satwant Transport	0.7 km	-15.44996390370° S	28.22489919826° E
Sable Transport	3.3 km	-15.44993442704° S	28.25032366757° E
Clyde Anderson School	0.5km	-15.44519358872° S	28.22566040990° E
Nearest Residential House	0.1 km	-15.44703434455° S	28.22782763482° E

The proposed expansion of CFK's e-waste facility will be implemented on legally owned land, with CFK holding a title deed (attached) as proof of ownership. The site is currently utilized for existing e-

waste management operations, including collection, sorting, dismantling, and storage of electronic waste. Rather than new construction, the project focuses on scaling up operations through the installation of advanced recycling technologies and the optimization of waste processing systems.

The facility is already equipped with fundamental infrastructure, including administrative offices, waste storage units, and essential utilities such as electricity and water. However, to enhance operational efficiency, ensure regulatory compliance, and mitigate environmental and social risks, the project will incorporate strategic upgrades. These will include the implementation of state-of-the-art pollution control technologies, reinforced occupational health and safety protocols, and specialized equipment to manage hazardous e-waste components more effectively.

Figure 1: Site Image (Operational Plant)

1.10 Project Alternatives

The developer considered two options for the layout:

1. **Convert the existing house**: The small size and inefficient design of the existing house were deemed unsuitable for the expanded operations.
2. **Expansion the warehouse (E-Waste Plant)**: This option was chosen because it allows for smoother process flow, better safety controls, and efficient use of space.

The proponent did not have an alternative site for the Project as the proposed location land has already been secured on farm no. 687 and title deed has already been obtained in the proponent's ownership, situated away from Lusaka central business district.

Technology alternatives: The developer has decided to go for the most efficient and modern technology on the market by using the ASC 800 PCB processor which leaves no metal residues and hence reduces pollution. The Project is an environmentally friendly alternative to the indiscriminate disposal of electronic wastes in ordinary landfills

1.11 Main findings of the Project

The Project proposes eco-friendly disposal of electronic waste (e-waste) by dismantling electronic equipment and recycling most of the materials used in the manufacture of the various electronic equipment. Among the main waste streams to be handled are cellular phones and computers. The equipment to be used include an ASC 800 Printed Circuit Board (PCB) processing machine, with a specification of maximum capacity of 300mm/s at a thickness of 2mm. Cathode ray tube cutter for dismantling CRTs, a cable stripper for stripping electrical and electronic cables, a jaw crusher for crushing plastic components, a baler for compacting crushed materials for Safe handling and storage, among to mention but a few.

The Project site currently has some small storage houses, a house being used as offices and a large Electronic Waste warehouse.

The developer (Crescent Future Kids Ltd) plans to expansion their Electronic waste management plant operations in Makeni Lusaka. The plant will be installing and employing advanced machinery and tools in the Electronic Waste warehouse under expansion into the various components of the proposed plant.

Generally, the major components of this Project will include:

- Installation of a Multi-Purpose Crusher Machine.
- Installation of a Printed Circuit Board (PCB) Processing Machine
- Installation of a Cathode Ray Tube (CRT) Processing machine
- Installation of an ABS Processing Machine
- Installation of a Baler
- Installation of a Weighbridge and Industrial Scale
- Installation of conveyors, pallet boxes, tools and small equipment
- Installation of safety equipment
- Landscaping of the surrounding
- Minor Modifications such as partitioning and refabricating of the warehouse using fisher boards, flat sheets and PVC Partitions

2.0 RELEVANT LEGISLATION, POLICY AND INSTITUTIONAL FRAMEWORK

2.1 Relevant National and International Legislation

This section outlines the legal and statutory framework applicable to the Crescent Future Kids (CFK) E-Waste Plant under the Environmental and Social Management Plan (ESMP). The project must comply with national environmental laws, sectoral regulations, and relevant international conventions to ensure sustainable operations, environmental protection, and social responsibility.

ZEMA Environmental License Status

CFK holds an environmental license issued by the Zambia Environmental Management Agency (ZEMA), currently under renewal. This ESMP supplements CFK's approved Environmental Impact Assessment (EIA) and is additionally aligned with the World Bank Environmental and Social Standards (ESSs).

The Vision 2030

The Vision 2030 is a government policy document that reflects the country's collective understanding, aspirations, and determination of the Zambian people to be a prosperous middle- income nation by 2030. The Vision provides that Zambia will aspire to achieve "universal access to clean, reliable and affordable energy at the lowest total economic, financial, social and environmental cost consistent with national developmental goals by 2030". The Vision is founded on seven key basic principles which include sustainable development. Sustainable Development requires that the exploitation of natural resources by the present generation is done in a manner that does not compromise the ability of the future generation to meet its own needs. To attain the Vision 2030, one of the NPF strategic objectives is to enforce environmentally and socially sustainable development principles. Vision 2030 is operationalized in sequential 5-year National Development Plans. Currently, the Eighth National Development Plan (8NDP) is in force.

Relevance to the proposed project: This policy document provides for opportunities for improving the well-being of all, embodying values of socio-economic justice, underpinned by the principles such as gender responsive sustainable development and respective for human rights among others.

Compliance thereof: The proposed project will be implemented in line with the principles of sustainable development. The developer will shall that non-discrimination of persons and that human rights are respected at all stages of the project.

2.1.1 The Eighth National Development Plan 2022 - 2026

The Eighth National Development Plan is a nationally owned and comprehensive document that was formulated through a highly consultative and participatory process, involving stakeholders across all sectors. In pursuit of the economic transformation agenda, the plan states that "it is imperative that development pathways are sustainable. This entails the sustainable utilization of natural resources which are the basis for wealth creation, as well as building resilience to the adverse effects of climate change. Thus, measures aimed at promoting green growth, safeguarding the environment and natural resources, enhancing climate change mitigation and adaptation, as well as strengthening disaster risk reduction, have been prioritized".

Relevance to the proposed project: The plan aims at safeguarding the environment and ensuring that development is sustainable.

Compliance thereof: The proposed project will be undertaken in an environmentally sound manner in line with all applicable local and international environmental regulations and standards.

2.1.2 National Policy on Environment, 2007

The National Policy on Environment (NPE) in Zambia establishes a comprehensive framework for the effective utilization of natural resources and environmental conservation, aligned with sustainable development goals. It aims to promote the protection and management of the environment and natural resources, balance social and economic development with environmental integrity, and integrate the activities and interests of various stakeholders, including the public, NGOs, and government at all levels. The policy seeks to accelerate sustainable growth to improve health, livelihoods, and living conditions, particularly for the poor, while ensuring environmental awareness, law enforcement, and accountability. Additionally, it focuses on building capacity for environmental sustainability and regulating sustainable industrial and commercial processes.

Relevance to the proposed project: The aim of this Policy is to ensure sound environmental management within a framework of sustainable development in Zambia. Once operational, an e- waste recovery facility will assist in terms of reducing the volume of e-waste materials to landfill, reducing indiscriminate disposal of e-waste and thus reducing open burning of e-waste materials at landfill sites.

Compliance thereof: The developer will ensure the project adheres to all relevant environmental regulations for sound environmental management.

2.1.3 The National Gender Policy 2023

Zambia's 2023 National Gender Policy is a comprehensive framework designed to address the gender inequalities that persist in the country. This policy aims to create a just and equitable society where women and girls have equal opportunities to participate fully in all aspects of national life. Recognizing the critical role of gender equality in achieving sustainable development, this policy outlines a set of strategic objectives and actions to promote gender equality and women's empowerment. It addresses key areas such as education, health, economic participation, political representation, and social protection.

Relevance to the proposed project: Gender equality plays a critical role in achieving sustainable development.
Compliance thereof: Crescent Future Kids Limited will ensure to adhere to the policy by giving equal opportunities to women in the recruitment of workers for the project.

2.1.4 The National Health Policy 2012

Zambia National Health Policy 2012 is a cross-sectoral strategic plan designed to improve the health status of the people of Zambia by providing equitable access to cost effective and quality health services as close to the family as possible. The policy recognizes that food safety and environmental health are among the national health priorities and addresses these issues by seeking to promote hygiene, universal access to safe water, acceptable sanitation and food safety to reduce the incidence of environmentally related diseases. Further, the policy recognizes that occupational mortality, morbidity and disability are

a major problem in Zambia. The objective of the policy is to achieve increased coverage of occupational health and safety services in all sectors to contribute to the reduction of occupational health and safety hazards at places of work.

Relevance to the proposed project: This policy is key as there will be need to observe occupational health and safety during construction and operational stages of the project.

Compliance thereof: The developer will ensure to adhere to all occupational health and safety issues by providing appropriate PPE and training, and by installing fire extinguishers in the facility as well as promoting hygiene and hand washing before eating.

2.1.5 The National Employment and Labour Market Policy, 2018

The Government of Zambia identified the need to formulate the 2018 National Employment and Labour Market Policy by building upon the successes and challenges identified in the implementation of the 2005 National Employment and Labour Market Policy. The Policy provides an appropriate and evidence-based response measures to the challenge of unemployment facing the Zambian economy. It also provides measures to progressively formalize the informal sector and employment, enhance national productivity, promote respect for fundamental principles and rights at work, and strengthen the labour administration and labour market information systems. Upon their achievement, all these objectives will contribute to inclusive growth and poverty reduction in Zambia.

Further, the policy provides a platform for an inclusive labour market through integration of the youth, women, rural communities and persons with disabilities into productive job opportunities in Zambia. Furthermore, the Policy will guide the nation towards the attainment of employment and labour objectives at sub-regional, regional and international levels as outlined in the National Development Plan.

Relevance to the proposed project: The proposed project will create job opportunities for all, integrating the youth, women and persons with disabilities.
Compliance thereof: The proposed project will contribute to poverty reduction through the creation of job opportunities at project operation phase. The developer shall ensure to promote respect for fundamental principles and rights at workplace.

2.1.6 The National Youth Policy, 2015

The National Youth Policy was adopted in 2015 with the aim of providing an enabling environment that promotes the rights and obligations of the Youth and foster their participation in national development. The policy defines a “youth” as a person aged between 15 and 35 years old. The policy also embraces provisions stipulated in various pieces of legislation and policies that regulate labour laws as a means of creating youth opportunities to legitimate work 18 and self- employment opportunities.

Relevance to the proposed project: The proposed project will create job opportunities for all, including the youth.

Compliance thereof: The proposed project will integrate and empower the youth through the creation of jobs. All forms of discrimination against the youth will be prohibited.

Table 3: Summary of Relevant National Legal Framework

Name of Legislation	Relevance to the Project	Compliance
Environmental Management Act No. 12 of 2011	The establishment of ZEMA is provided under this Act, requiring Environmental Impact Assessment studies for new projects.	The EPB report for the project has been prepared in compliance with Section 29 of this Act.
Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, SI No. 28 of 1997	Regulates the conduct, submission, and approval process of EIAs.	The Environmental Project Brief was prepared in compliance with this regulation.
Environmental Management (Licensing) Regulations of SI No. 112 of 2013 Part III	Provides for the licensing of non-hazardous solid waste transportation and disposal sites.	Solid wastes will be managed according to the provisions of this regulation.
Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013 Part II	Provides for the licensing of gaseous waste emissions.	Dust collectors will be installed and air quality monitored regularly.
Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013 Part IV	Provides for licensing of hazardous waste management.	Hazardous waste will be managed with appropriate containment and secured storage.
Environmental Management (Extended Producer Responsibility) Regulations, Statutory Instrument No. 65 of 2018	Regulates packaging materials and resultant waste.	Measures will be employed to minimize the impact of e-waste.
Information and Communication Technologies Act No. 15 of 2009	Regulates electronic communication services and products.	Confidential information in e-waste will be securely destroyed or erased.
Solid Waste Regulation and Management Act No. 20 of 2018	Provides for regulation and management of solid waste.	A licensed waste management company will be engaged.
Persons with Disabilities Act No. 6 of 2012	Protects the interests of persons with disabilities.	Measures will ensure accessibility and fair treatment for persons with disabilities.
National Heritage Conservation Act No. 19 of 2021	Preservation of cultural and natural heritage resources.	Any discovered artifacts will be documented and reported.
The Forests Act No. 4 of 2015	Promotes conservation of tree species.	Tree species will be safeguarded, avoiding unnecessary cutting.
The Zambia Wildlife Act No. 14 of 2015	Establishes guidelines for the preservation of wildlife.	Endangered species reports and compliance will be maintained.
The Gender Equity and Equality Act No. 22 of 2015	Promotes gender equality in all spheres of life.	Measures to prevent discrimination and promote integration will be implemented.
Local Government Act No. 2 of 2019	Ensures democratic participation and decentralization of local government functions.	Engagement with Livingstone City Council will be conducted.
Public Health Act No. 22 of 1995	Prevention and suppression of public health hazards.	Environmental health guidelines will be followed.
The Occupational Health and Safety Act No.36 of 2010	Prevents work-related injuries and ensures workplace safety standards.	Health and safety trainings and PPE provision will be prioritized.
Employment Code Act No. 3 of 2019	Provides conditions for employee protection and social security.	Employment contracts and conditions of service will be established.

The Water Supply and Sanitation Act No. 20 of 1997	Regulates public water and sanitation services.	Water supply and sanitation standards will be adhered to.
Water Resources Management Act of 2011	Management and conservation of water resources.	Required permits and renewals for borehole usage will be obtained.
Workers Compensation Act No.10 of 1999	Social security provisions for employee compensation.	Employees will be registered with the Workers Compensation Authority.
The National HIV/AIDS/STI/TB Council Act of 2002	Coordinates efforts to combat HIV, AIDS, STI, and TB.	Awareness among workers and local communities will be raised.
Land and Land Acquisition Act No. 20 of 2015	Regulates the alienation and acquisition of land.	The project site is legally acquired, and lease agreements are attached.
Urban and Regional Planning Act No. 3 of 2015	Provides principles for sustainable urban and regional planning.	Necessary documentation will be submitted to Livingstone City Council.
Investment Act No. 18 of 2022	Provides a legal framework for investment.	Investment procedures will be followed during project implementation.
Factories Act, Cap 441	Safety and inspection of plant and machinery.	Safety requirements and training will be adhered to.
Factories (Electricity) Regulations	Safety of electrical installations.	Electrical installation activities will comply with these regulations.
Public Health (Notifiable) (Coronavirus disease 2019) Regulations, SI 22 of 2020	Preventative measures aimed at containing COVID-19.	Measures to control the spread of the pandemic will be put in place.
The Human Rights Commission Act, No. 4 of 2024 (Cap. 48)	Promotes human rights and prevents abuses.	Measures to ensure fair treatment and prevent discrimination will be implemented.
The Ionizing Radiation Protection (Amendment) Act No. 19 of 2011	Protection from hazards arising from ionizing radiation.	PPE provision and safety measures will be ensured.
The Anti-Gender-Based Violence Act, 2011	Protection of victims of gender-based violence.	Awareness and reporting measures will be implemented.
The Employment Young Persons and Children (Amendment) Act, 2004	Regulates employment of young persons and children.	Children and young persons under 18 will not be employed.

2.2 Institutional Framework

The following institutional framework will govern the operations of Crescent Future Kids (CFK) Limited's environmental and social management efforts under the Environmental and Social Management Plan (ESMP)**:**

2.2.1 Ministry of Green Economy and the Environment

The Ministry of Green Economy and the Environment is responsible for overseeing the formulation of environmental policies, strategy development, and the management of natural resources, pollution control, and sustainable development. This ministry also ensures that environmental impacts are minimized through adherence to relevant laws and regulations, promoting Zambia's green economy.

Role in ESMP Implementation:

- Provides policy guidance on environmental sustainability and green economy initiatives.
- Ensures CFK's compliance with national environmental laws and policies.

- Supports the implementation of sustainable waste management and pollution control strategies.
- Oversees the integration of climate change adaptation and mitigation measures in project activities.

2.2.2 Zambia Environmental Management Agency (ZEMA)

The Zambia Environmental Management Agency (ZEMA) is a statutory body established under the Environmental Management Act (EMA), No. 12 of 2011. ZEMA's responsibilities include:

- Integrated environmental management and protection, as well as the sustainable use of natural resources.
- Prevention and control of environmental pollution and degradation.
- Promoting public participation in environmental decision-making and ensuring access to environmental information.
- Conducting environmental audits and monitoring activities.
- Facilitating the implementation of international environmental agreements and conventions to which Zambia is a signatory.

In terms of institutional hierarchy, ZEMA operates under the Ministry of Green Economy and the Environment. Thus, this ESMP has been prepared for submission to ZEMA for the consideration of the proposed CFK Limited Project activities.

Role in ESMP Implementation:

- Reviews and approves the ESMP to ensure alignment with national environmental standards.
- Conducts environmental audits and monitoring to verify compliance with regulations.
- Enforces pollution control measures to minimize environmental degradation.
- Facilitates stakeholder engagement by ensuring public participation in environmental decision-making.
- Ensures CFK aligns with Zambia’s international environmental commitments under multilateral agreements.

2.2.3 Ministry of Local Government and Rural Development

The Ministry of Local Government and Rural Development is responsible for local government policy related to infrastructure development, human settlement, and environmental management at the community level. Local authorities operate under the oversight of this ministry, which plays a critical role in ensuring the alignment of local and national strategies for sustainable development. CFK Limited’s Project activities may require the involvement of local authorities, especially in areas related to waste management and public health.

Role in ESMP Implementation:

- Provides **oversight and coordination** of local government environmental initiatives.
- Ensures that CFK’s activities align with **local and national waste management strategies**.
- Facilitates collaboration between CFK and **local authorities** for effective environmental governance.

- Supports the integration of public health and infrastructure development considerations in waste management.

2.2.4 Lusaka City Council (LCC)

The Lusaka City Council (LCC), established under the Local Government Act No. 22 of 1991, is responsible for enforcing local regulations and by-laws related to environmental and public health matters within its jurisdiction. The functions of the LCC include waste management, public health management, water supply and sanitation, and the enforcement of relevant local laws.

CFK Limited will be subject to the LCC's by-laws and will be required to obtain the necessary licenses, permits, and approvals for its Project activities, especially concerning waste management and environmental health in the Lusaka area.

Role in ESMP Implementation:

- Enforces **local environmental regulations and by-laws** applicable to CFK's operations.
- Issues **licenses, permits, and approvals** for CFK's waste management and environmental health activities.
- Monitors CFK's **waste collection, disposal, and treatment** practices to ensure compliance with municipal standards.
- Supports **community awareness programs** on responsible e-waste disposal and environmental health.

Some of the licenses or permits that CFK Limited may need to obtain from the **Lusaka City Council (LCC)** relevant to the e-waste project include:

- **Business Operating Permit (BOP):** Required to legally operate the e-waste facility within Lusaka's jurisdiction.
- **Waste Management Permit:** Essential for managing and disposing of general solid waste and e-waste, ensuring proper handling and disposal of waste generated during operations.
- **Environmental Health Permit:** Required to meet public health and safety standards related to waste management, air quality, and sanitation in the facility.
- **Fire Safety Permit:** Needed to ensure fire safety measures are in place, especially for hazardous materials like batteries and other e-waste components.
- **Planning and Zoning Approval:** To verify that the facility complies with local zoning regulations and is permitted for industrial or waste management activities.
- **Noise and Vibration Control Permit:** To regulate noise and vibration levels from operations, ensuring compliance with local noise regulations.
- **Health and Safety Compliance Certification:** To ensure that the facility complies with local workplace health and safety standards, including proper PPE usage and hazard management.

2.3 International and Regional Conventions

Zambia is a signatory to several international environmental and occupational health conventions relevant to this project. As a signatory, Zambia has committed to incorporating the principles and standards of these conventions into national legislation to ensure compliance. These agreements are essential in guiding the CFK E-Waste Management Project's Environmental and Social Management

Plan (ESMP) by setting benchmarks for environmental sustainability, occupational health and safety, and hazardous waste management.

2.3.1 Basel Convention and Bamako Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal aims to protect human health and the environment by regulating hazardous waste movement across borders. It requires prior notification and approval for exporting hazardous waste to another country.

The **Bamako Convention** complements the Basel Convention, focusing on banning the import of hazardous waste into Africa and controlling its movement within the continent. E-waste often contains hazardous substances such as lead, cadmium, and mercury, which require strict handling procedures.

Relevance to the Proposed Project:
E-waste is classified as hazardous waste under the Basel Convention.
Any international movement of e-waste components must comply with these regulations.
Compliance and Reporting Requirements:
CFK will maintain detailed records of e-waste imports and exports by comply with notification procedures for transboundary movement, obtaining necessary approvals from Zambian regulatory authorities and recipient countries. Annual reports on e-waste handling and disposal shall be submitted to Zambia Environmental Management Agency (ZEMA) and relevant authorities.

2.3.2 Kyoto Protocol and the Paris Agreement on Climate Change

The **Kyoto Protocol** and **Paris Agreement** are key international frameworks aimed at reducing greenhouse gas emissions. E-waste recycling can contribute to emissions reductions by limiting the demand for new materials and reducing energy consumption.

Relevance to the Proposed Project:
The CFK project aligns with Zambia's commitment to reducing greenhouse gas emissions.
Proper e-waste management reduces emissions from improper disposal methods such as burning.
Compliance and Reporting Requirements:
CFK will track and report its carbon footprint from e-waste processing operations.
Energy efficiency and low-emission practices will be adopted, and reports will be submitted in line with Zambia's climate commitments.

2.3.3 Convention on Occupational Health and Safety (ILO Conventions)

The **ILO Convention No. 155** (Occupational Safety and Health Convention) and **ILO Convention No. 170** (Safety in the Use of Chemicals at Work) ensure worker protection from occupational hazards.

Relevance to the Proposed Project: The e-waste recycling process exposes workers to hazardous substances.
Compliance and Reporting Requirements: CFK will implement a robust occupational health and safety (OHS) policy. Workers will receive personal protective equipment (PPE) and training.
Occupational health records will be maintained and reported to relevant authorities.

2.3.4 Stockholm Convention on Persistent Organic Pollutants (POPs)

The **Stockholm Convention** regulates the use and disposal of **POPs**, which are found in e-waste.

Relevance to the Proposed Project: CFK will handle materials containing POPs, such as flame retardants in plastics.
Compliance and Reporting Requirements: Hazardous waste inventory reports will be submitted to ZEMA. Best Available Techniques (BAT) and Best Environmental Practices (BEP) will be employed to minimize POPs release.

2.3.5 Minamata Convention on Mercury

The **Minamata Convention** aims to reduce mercury exposure and emissions.

Relevance to the Proposed Project: Mercury-containing devices such as older lighting equipment will be processed.
Compliance and Reporting Requirements: CFK will establish a mercury waste management plan and report handling procedures to authorities.

2.3.6 Rotterdam Convention on Hazardous Chemicals and Pesticides

The Rotterdam Convention regulates the trade of hazardous chemicals to ensure informed decision making.
Relevance to the Proposed Project: Some e-waste components contain regulated hazardous chemicals.
Compliance and Reporting Requirements: CFK will comply with Prior Informed Consent (PIC) procedures when necessary. Documentation of hazardous materials will be maintained and reported.

2.3.7 Vienna Convention for the Protection of the Ozone Layer & The Montreal Protocol

These agreements regulate substances that deplete the ozone layer.
Relevance to the Proposed Project: Some electronic components contain ozone-depleting substances (ODS).
Compliance and Reporting Requirements: CFK will ensure proper disposal of ODS-containing materials and report on compliance.

2.3.8 Strategic Approach to International Chemicals Management (SAICM)

SAICM promotes safe chemical handling and waste management.
Relevance to the Proposed Project: CFK will handle hazardous chemicals in e-waste.
Compliance and Reporting Requirements: Hazardous materials management plans will be documented and reported.

2.3.9 The United Nations Sustainable Development Goals (SDGs)

The SDGs promote balanced social, economic, and environmental sustainability. SDG 12 (Responsible Consumption and Production) emphasizes waste reduction and recycling.

Relevance to the Proposed Project: The CFK project contributes to sustainable waste management.
Compliance and Reporting Requirements: CFK will report recycling rates and sustainable practices in line with SDG 12.

In addition to the international agreements and conventions outlined, the following relevant agreements have been identified:

2.3.10 Bamako Convention

The Bamako Convention is a treaty of African nations prohibiting the import of hazardous waste into Africa and controlling the transboundary movement and management of hazardous wastes within the continent.

Relevance to the proposed project: Zambia is a signatory to the Bamako Convention, which aligns with the project's objectives of managing hazardous waste, including e-waste, within Africa.

Compliance: The developer will ensure that the project adheres to the Bamako Convention's guidelines by preventing the import of hazardous waste and managing any hazardous waste generated in an environmentally sound manner.

2.3.11 Basel Convention Ban Amendment

The Basel Convention Ban Amendment prohibits the export of hazardous wastes, including e-waste, from member countries of the Organisation for Economic Co-operation and Development (OECD), the European Union, and Liechtenstein to other countries.

Relevance to the proposed project: While Zambia is not an OECD member, understanding this amendment is crucial to ensure that any e-waste imported into Zambia complies with international regulations, thereby preventing illegal dumping from developed countries.

Compliance*:* The developer will verify that any imported e-waste materials comply with the Basel Convention Ban Amendment to prevent illegal dumping and ensure environmentally sound management.

2.3.12 International E-waste Day

International E-waste Day, observed annually on October 14th, aims to raise awareness about the importance of recycling e-waste and encourages consumers to recycle electronic equipment responsibly.

Relevance to the proposed project*:* Participating in International E-waste Day can enhance the project's community engagement efforts and promote responsible e-waste recycling practices among consumers.
Compliance*:* The developer will participate in International E-waste Day activities to raise awareness about responsible e-waste recycling and promote the project's commitment to environmental sustainability.

2.3.13 Global E-waste Statistics Partnership (GESP)

The GESP is a collaboration between the International Telecommunication Union (ITU), United Nations University (UNU), and the International Solid Waste Association (ISWA) to monitor developments in e-waste over time and help countries produce reliable e-waste statistics.

Relevance to the proposed project*:* Engaging with the GESP can provide valuable data and insights to inform the project's e-waste management strategies and ensure alignment with global best practices.

Compliance*:* The developer will engage with the GESP to access reliable e-waste statistics and incorporate global best practices into the project's e-waste management strategies.

2.3.14 The United Nations and E-waste

The United Nations has various initiatives aimed at addressing the e-waste challenge, including promoting the environmentally sound management of e-waste and reducing its generation.

Relevance to the proposed project*:* Aligning with UN initiatives on e-waste can enhance the project's credibility and ensure adherence to international standards for e-waste management.

Compliance: The developer will align the project's e-waste management practices with UN initiatives to ensure adherence to international standards and enhance the project's credibility.

2.3.15 Global E-waste Monitor 2024

The Global E-waste Monitor is a series of reports that provide comprehensive assessments of global e-waste statistics, including quantities generated, transboundary movements, and recycling rates.

Relevance to the proposed project*:* Utilizing data from the Global E-waste Monitor can inform the project's strategies for e-waste collection, recycling, and disposal, ensuring they are based on the latest global trends and data.

Compliance*:* The developer will utilize data from the Global E-waste Monitor to inform the project's e-waste management strategies, ensuring they are based on the latest global trends and data.

By integrating these additional international agreements and conventions into the CFK ESMP, the project will further align with global best practices in environmental management and e-waste handling.

2.4 Compliance Monitoring and Reporting Framework

To ensure compliance with international conventions and agreements, CFK will implement a **Compliance Monitoring and Reporting Framework** that includes:

2.4.1 Institutional Oversight and Reporting Obligations

- **Zambia Environmental Management Agency (ZEMA):** Submission of Environmental Impact Assessment (EIA) reports, hazardous waste management plans, and compliance monitoring data.
- **Ministry of Green Economy and Environment:** Reports on climate change mitigation and SDG-related efforts.
- **Ministry of Labour and Social Security:** Submission of occupational health and safety records.
- **Zambia Wildlife Authority (ZAWA):** Reporting on biodiversity conservation efforts.

2.4.2 Reporting Frequency

- **Quarterly Reports**: Occupational health and safety compliance, waste management statistics.

- **Annual Reports**: Carbon footprint assessments, biodiversity monitoring, hazardous waste inventory.
- **Incident Reports**: Immediate reporting of environmental or safety breaches.

2.4.3 Stakeholder Engagement

- **Community Consultations:** Periodic engagement with local communities.
- **International Reporting:** Submission of relevant reports to UN agencies and treaty bodies as required.

2.5 World Bank Environmental and Social Framework (ESF)

The ESF aims at protecting people and the environment from potential adverse impacts that could arise from World Bank-funded projects and promotes sustainable development. This framework provides broad coverage, including important advances on transparency, non-discrimination, social inclusion, public participation, and accountability. It promotes enhanced transparency and stakeholder engagement through timely information disclosure, meaningful and ongoing consultations throughout the project life cycle, and responsive grievance mechanisms to facilitate the resolution of concerns and grievances of project-affected parties.

The ESF consists of ten (10) Environmental and Social Standards (ESSs). However, five (5) of the ESSs are relevant to the proposed establishment and operation of an e-waste facility in Lusaka District.

The ESSs relevant to the proposed E-waste recovery project are:

- ESS 1: Assessment and Management of Environmental and Social Risks and Impacts
- ESS 2: Labor and Working Conditions.
- ESS 3: Resource Efficiency and Pollution Prevention.
- ESS 4: Community Health and Safety.
- ESS 10: Stakeholder Engagement and Information Disclosure.

2.5.1 ESS 1: Assessment and Management of Environmental and Social Risks and Impacts

ESS1 sets out the Borrower's responsibilities for assessing, managing, and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing (IPF), to achieve environmental and social outcomes consistent with the Environmental and Social Standards (ESSs). ESS1 applies to all projects supported by the Bank through IPF.

The objectives of ESS1 are indicated below.

- To identify, evaluate and manage the environmental and social risks and impacts of the project in a manner consistent with the ESSs
- To adopt a mitigation hierarchy approach to: (a) Anticipate and avoid risks and impacts; (b) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; (c) Once risks and impacts have been minimized or reduced, mitigate; and (d) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible

- To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project
- To utilize national environmental and social institutions, systems, laws, regulations, and procedures in the assessment, development, and implementation of projects, whenever appropriate
- To promote improved environmental and social performance in ways that recognize and enhance Borrower capacity

ESS requires that borrowers (project developers) manage environmental and social risks and impacts of the project throughout the project life cycle in a systematic manner, proportionate to the nature and scale of the project and the potential risks and impacts.

Further, ESS1 requires that the developer of a project financed by the World Bank conduct an environmental assessment and prepare appropriate instruments including the Environmental and Social Impact Assessment and the Environmental and Social Management Plans.

Relevance of ESS1 to the proposed project: The proposed project to establish and operate an e-waste facility will involve collection, storage, and dismantling of e-waste materials. These activities have potential risks and impacts as e-waste is considered hazardous waste due to some harmful/hazardous components such as lead and mercury it contains. Hence the relevance.

ESS1 applies to all projects financed by the World Bank through IPF. The proposed project by Crescent Future Kids Limited (CFK) seeks financial support from the Bank. The project will be implemented once the grant is approved by the World Bank.

Compliance: CFK has conducted an environmental assessment which included screening of the site, identifying of the E&S risks and impacts and prepared the ESMP, which will be implemented and monitored.

2.5.2 ESS 2: Labour and Working Conditions

ESS2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions.

ESS2 Objectives include:

- To promote safety and health at work
- To promote the fair treatment, non-discrimination, and equal opportunity of project workers
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS), migrant workers, contracted workers, community workers, and primary supply workers, as appropriate
- To prevent the use of all forms of forced labour and child labour
- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law
- To provide project workers with accessible means to raise workplace concerns

ESS2 applies to project workers including full-time, part-time, temporary, seasonal, and migrant workers.

Relevance of ESS2 to the proposed project: This standard is relevant because the proposed project will create employment for locals on full-time, part-time, and temporary basis with added attention to the vulnerable populations, particularly focusing on unemployed youth and women from lower-income communities and preventing forced labour and child labour. The developer needs to put in place measures to promote sound worker-employer relationships, deliberately ensure that all workers are treated fairly and provided with safe and healthy working conditions, as the proposed project will result in occupational health hazards and risks.

Compliance: CFK will comply with the World Bank standard ESS2, including local national law and labour regulations, by providing a safe and healthy working environment for project workers by ensuring potential hazards are identified, process modifications or substitutions are done, appropriate training for workers is conducted, emergency response plans are prepared, and appropriate PPE provided to all workers. Deliberate measures will be put in place to create sound worker-management relationships.

2.5.3 ESS 3: Resource Efficiency and Pollution Prevention

ESS3 recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services, and the environment at local, regional, and global levels. The current and projected atmospheric concentration of greenhouse gases (GHG) threatens the welfare of current and future generations. At the same time, more efficient and effective resource use, pollution prevention, and GHG emission avoidance, and mitigation technologies and practices have become more accessible and achievable.

ESS3 Objectives

- To promote the sustainable use of resources, including energy, water, and raw materials
- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities
- To avoid or minimize project-related emissions of short- and long-lived climate pollutants
- To avoid or minimize generation of hazardous and non-hazardous waste
- To minimize and manage the risks and impacts associated with pesticide use

Relevance of ESS3 to the proposed project: ESS3 recognizes that economic activity and urbanization often generate pollution to air, water, and land. The proposed project activities may result in air, water, and land pollution if not well managed.

Compliance: CFK will avoid the release of pollutants; where avoidance is not feasible, CFK will minimize and control the concentration and mass flow of their release using the performance levels and measures specified in the Zambian environmental regulations and law. Additionally, CFK will implement technically and financially feasible measures for improving efficient consumption of energy, water, and raw materials as well as other resources. This Environmental and Social Management Plan (ESMP) has been prepared to address and mitigate all potential risks/impacts associated with the proposed project.

2.5.4 ESS 4: Community Health and Safety

ESS4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration or intensification of impacts due to project activities. ESS4 addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their particular circumstances, may be vulnerable.

ESS4 Objectives

- To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and non-routine circumstances
- To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams
- To avoid or minimize community exposure to project-related traffic and road safety risks, diseases, and hazardous materials
- To have in place effective measures to address emergency events
- To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities

Relevance of ESS4 to the proposed project: The proposed project activities (i.e., collection, storage, and dismantling of e-waste) may expose the local community to risks and impacts from e-waste materials. ESS4 is also relevant because e-waste has the potential to cause heavy metal contamination, which may compromise the health and safety of the local community.

Compliance: CFK will assess the risks and impacts of the project on the health and safety of the affected communities. CFK will operate the facility in accordance with local safety regulations, and quality management systems put in place. Further, CFK will put in place appropriate safety signage, raise awareness about the dangers of e-waste and its improper disposal in appropriate languages.

2.5.5 ESS 10: Stakeholder Engagement and Information Disclosure

This ESS recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. Stakeholder engagement is an inclusive process conducted throughout the project life cycle. Where properly designed and implemented, it supports the development of strong, constructive, and responsive relationships that are important for successful management of a project's environmental and social risks.

ESS10 Objectives

- To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties
- To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be considered in project design and environmental and social performance

- To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them
- To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible, and appropriate manner and format

Relevance of ESS10 to the proposed project: This standard is relevant because stakeholder engagement and consultation is part of the EIA process in Zambia and is required by law for projects of this magnitude.

Compliance: In the already submitted and approved EIA (EPB), CFK conducted an extensive consultation process, interviewing and consulting local residents, the Lusaka District Council, and other interested parties. Their feedback and concerns have been noted, and responses to these concerns have been addressed. An attendance register of those consulted was incorporated into the EIA report, which was approved and the ZEMA Decision Letter is attached as an Annex to this document. CFK shall continue to ensure compliance with ESS10 as a best practice and in alignment with national regulations and requirements for meaningful engagement and inclusion regarding project activities throughout Project cycle.

2.6 World Bank Environmental Health and Safety Guidelines and Good Industry Practices

The World Bank Environmental, Health, and Safety (EHS) Guidelines are technical reference documents that provide general and industry-specific examples of Good International Industry Practice. These guidelines outline performance levels and measures that are generally achievable for new facilities using existing technology at reasonable costs. For existing facilities, the application of these guidelines may require the establishment of site-specific targets, accompanied by an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks identified for each project based on the results of an environmental assessment, which considers site-specific variables such as host country context, the assimilative capacity of the environment, and other relevant project factors.

Specific technical recommendations should be applied based on the professional opinion of qualified and experienced personnel. In instances where host country regulations differ from the levels and measures outlined in the EHS Guidelines, projects are expected to comply with the more stringent of the two. If less stringent measures than those provided in the guidelines are considered appropriate due to specific project circumstances, a detailed justification for the alternatives must be included in the site-specific environmental assessment. This justification should demonstrate that the chosen performance levels are protective of both human health and the environment.

The EHS Guidelines aim to prevent waste generation and promote practices such as reuse, recycling, good housekeeping, inventory control, damage avoidance, and procurement measures that allow the return of reusable materials. Section 1.6 of the EHS Guidelines on Waste Management emphasizes the segregation of hazardous waste from other types of waste, ensuring appropriate storage in clearly labelled containers, and maintaining comprehensive record-keeping. Furthermore, the collection, transport, and disposal of hazardous waste must adhere to both the EHS Guidelines and local regulations. Monitoring records for hazardous waste collected, stored, or shipped should follow the recommended procedures.

Additionally, the EHS Guidelines recommend the implementation of training programs for personnel handling hazardous waste, ensuring they are adequately informed of safety procedures and emergency response protocols. Regular audits and inspections are also encouraged to maintain compliance and identify areas for continuous improvement. The guidelines further stress the importance of community engagement and education on hazardous waste management, fostering awareness and collaboration to enhance overall waste management efforts and ensuring the safe and efficient management of electronic waste. This approach protects both human health and the environment.

The proposed project to establish and operate an e-waste facility by Crescent Future Kids Limited (CFK) will strive to comply with all relevant EHS Guidelines.

2.7 Environmental and Social Risk Classification

The Bank will classify all projects (including projects involving Financial Intermediaries (FIs)) into one of four classifications: High Risk, Substantial Risk, Moderate Risk, or Low Risk. In determining the appropriate risk classification, the Bank will take into account relevant issues such as the type, location, sensitivity, and scale of the project; the nature and magnitude of the potential environmental and social risks and impacts; and the capacity and commitment of the Borrower (including any other entity responsible for the implementation of the project) to manage the environmental and social risks and impacts in a manner consistent with the ESSs.

This project is classified as substantial as its activities may have irreversible environmental risks and impacts due to the toxic nature of the e-waste that will be handled. These may have a negative impact on human health, soil, water, and air.

Table 4: Relevant World Bank Environmental and Social Standards

EHS Guideline	Relevance to the Project	Compliance Thereof
Air Emissions and Ambient Air Quality	This guideline applies to facilities or projects that generate emissions into the air during any stage of the project life cycle.	CFK will ensure that emissions of gases such as SO_2, NO_2, and Particulate Matter (dust) are below the WHO Ambient Air Quality Guidelines by conducting regular air quality assessments.
Hazardous Materials Management	These guidelines apply to projects that use, store, or handle hazardous materials (Hazmats), which represent a risk to human health, property, or the environment due to their chemical or physical characteristics. Hazmats in this context may include e-waste materials such as batteries and PCB-containing equipment.	CFK will ensure the protection of the workforce by providing appropriate PPE and ensuring safe handling, storage, and disposal of hazardous materials. Training will be provided to workers in emergency preparedness and response. The project will also ensure protection of the environment by preventing and controlling releases of Hazmats.
Waste Management	These guidelines apply to projects that generate, store, or handle waste. The CFK project is involved in the aggregation, sorting, and recycling of e-waste, including hazardous materials.	CFK will establish a waste management hierarchy focusing on prevention, reduction, reuse, recycling, recovery, and, as a last resort, disposal of waste. The developer recognizes that disposal is the last option, and recyclable materials will be separated at the source and sent to a recycling facility operated by CFK. Non-recyclable wastes will be disposed of at an approved local site.
Noise and Vibrations	Management of noise impacts from e-waste processing, including during waste collection, sorting, and transportation. This guideline applies to noise generated during operations that might exceed acceptable levels at sensitive receptors.	CFK will adhere to the noise level guideline of 70dBA. Noise monitoring will be conducted, and corrective actions will be taken where noise levels exceed the prescribed limit. Noise control measures will be implemented at the facility to ensure minimal disturbance to surrounding communities.
Contaminated Land	This guideline addresses land contamination due to hazardous materials or waste, which may result from accidental releases during storage, handling, or disposal of e-waste.	In case of accidental spillage or release of hazardous materials causing land pollution, CFK will undertake bioremediation as per the guidelines. Contamination will be prevented by controlling the release of hazardous materials, and any land contamination will be promptly identified and addressed to prevent further adverse impacts.
Occupational Health and Safety (OHS)	The guideline covers the protection of worker health and safety, including managing physical, chemical, biological, and	CFK will ensure that preventive and protective measures are implemented in the following order: elimination of hazards,

	radiological hazards at the facility. It requires the provision of Personal Protective Equipment (PPE).	controlling risks, and minimizing remaining hazards. OHS assessments will be conducted, and corrective actions will be taken where necessary. CFK will provide appropriate PPE and regular training for workers on safety procedures and proper use of PPE.
Community Health and Safety	This guideline focuses on ensuring the health and safety of surrounding communities during project activities, including disease prevention, transportation of hazardous materials, and emergency preparedness.	CFK will ensure the community's health and safety by adhering to guidelines related to disease prevention, ensuring proper transportation and disposal of hazardous materials, and maintaining emergency response plans. Safety signage will be placed, and the public will be educated about the risks of e-waste and improper disposal methods.
Construction and Decommissioning	This section provides specific guidance on preventing and controlling community health and safety impacts during construction, decommissioning, or modifications to project facilities.	CFK will adhere to construction and decommissioning safety guidelines, ensuring that community health and safety impacts are minimized throughout these phases of the project lifecycle. Safety measures will be implemented, and any potential risks during the construction or decommissioning stages will be proactively addressed.

Table 5: List of EHS Guidelines Applicable to the proposed E-waste Management Project

3.0 INFORMATION DESCRIBING THE PROJECT

3.1 Location

The Project site is located at **Farm No. 687, Makeni**, Lusaka, with the following coordinates: **35L0631637 UTM 8291848E**. The site is easily accessible from the central business district via Los Angeles Road, Kalusha Bwalya Road, Mumbwa Road and Makeni Road. The location includes an existing e-waste facility, warehouse and other facilities, with room for expansion.

The proposed expansion of CFK's e-waste facility will be implemented on legally owned land, with CFK holding a title deed (attached) as proof of ownership. The site is currently utilized for existing e-waste management operations, including collection, sorting, dismantling, and storage of electronic waste. Rather than new construction, the project focuses on scaling up operations through the installation of advanced recycling technologies and the optimization of waste processing systems.

The facility is already equipped with fundamental infrastructure, including administrative offices, waste storage units, and essential utilities such as electricity and water. However, to enhance operational efficiency, ensure regulatory compliance, and mitigate environmental and social risks, the project will incorporate strategic upgrades. These will include the implementation of state-of-the-art pollution control technologies, reinforced occupational health and safety protocols, and specialized equipment to manage hazardous e-waste components more effectively.

Objectives of the Project include the following;

- To meet regulatory requirements.
- To reduce the quantity of waste going to the landfill (or increase recycling rates).
- To keep heavy metals out of the waste stream.
- To conserve natural resources.
- To support reuse of computers with repair and training programs.
- To generate revenue.

Figure 2: Satellite Location Map of Project Site

Figure 3: Site Images showing buffer area and safety zone

3.2 Land Tenure and Zoning

The said piece of land belongs to Crescent Future Kids by government title. A copy of the title deeds is attached as an Appendix of this document

3.3 Nature of the Project

Crescent Future Kids (CFK) Limited plans to expansion its facility to process electronic waste (e-waste) in an environmentally sustainable manner. This initiative focuses on recycling and safe disposal of various components from electronic equipment, including computers, cellular phones, household appliances, and industrial electronics.

The Project will include the following major components:

- **Facility Expansion**: Upgrading and preparing the warehouse to accommodate e-waste processing machinery and optimize operations.
- **Acquisition and Installation of Equipment**:

  The following machinery will be installed indoors:

  - **Metal Crusher**: For processing metallic parts.
  - **PCBoard Processor**: For recycling printed circuit boards.
  - **CRT Cutter**: For handling cathode ray tubes.
  - **ABS Processor**: For shredding plastic components.
  - **Cable Stripper**: For recovering metals from cables.
  - **Baler**: For compacting recyclable materials.
  - **Conveyors**: For streamlining the movement of materials.
  - **Pallet Boxes**: For securing storage of segregated materials.
  - **Weighbridge and Industrial Scales**: For accurate measurement and inventory management.

3.3.1 Scope of E-Waste Activities

CFK will focus on the recovery, dismantling, and partial refurbishment of a clearly defined set of e-waste categories. Activities will involve manual dismantling and sorting, with no hazardous processing (e.g., chemical treatment or smelting). The facility will operate under strict occupational health and safety standards."

3.3.1.1 E-Waste Categories to be Collected and Processed

Category	Examples	Key Components/Materials
ICT Equipment	Computers, Laptops, Printers, Mobile Phones, Servers	Printed circuit boards (PCBs), Lithium-ion batteries, Plastic casings, Metals (copper, gold, aluminium)
Large Household Appliances	Refrigerators, Washing Machines, Air Conditioners, Electric Cookers	Copper wiring, Compressors, Metal frames, Plastics, Insulation foam
Small Household Appliances	Toasters, Irons, Hairdryers, Coffee makers, Microwave Ovens	Plastics, Copper wiring, Heating elements
Consumer Electronics	Televisions (CRT and flat screens), Radios, Speakers, Video players	CRTs (lead glass), LCDs (mercury), PCBs, Batteries, Plastics
Lighting Equipment	Fluorescent Lamps, LED Bulbs	Mercury (in fluorescent lamps), Glass, Electronics
Batteries (Small Types)	Lithium-ion batteries, Alkaline batteries, NiCd batteries	Lithium, Cobalt, Nickel, Lead, Cadmium
Electrical and Electronic Tools	Drills, Saws, Sewing Machines (electronic parts)	Motors, Copper wiring, Plastics

3.3.1.2 Exclusion List (Items Not Accepted)

Excluded Item	Reason for Exclusion
Solar Photovoltaic (PV) Panels	Specialized handling required; outside project scope
Electrical equipment containing PCBs	Highly toxic; requires hazardous waste facilities
Large Industrial Equipment	Size and handling complexity exceed facility capacity
Medical Equipment	Potential biohazards and regulatory complexity
Radioactive Materials	Special regulatory and environmental requirements

3.3.1.3 Toxic Substances in E-Waste

Key Toxic Substances Handled;

E-Waste Type	Key Toxic Substances
CRT Monitors	Lead, Phosphor compounds
LCD Screens	Mercury
Printed Circuit Boards (PC Boards)	Lead, Cadmium, Flame Retardants
Batteries (Li-ion, Alkaline)	Lithium, Cobalt, Nickel
Fluorescent Lamps	Mercury
Plastics	Brominated Flame Retardants

3.3.2 Daily Operational Processes

The day-to-day processes at CFK's e-waste management facility will include:

1. **E-Waste Collection**:
   - Collection of e-waste from designated drop-off points, businesses, and households.
   - Transporting the collected waste to the processing facility using dedicated vehicles.
2. **Sorting and Segregation**:
   - Manual sorting of e-waste to separate components such as metals, plastics, circuit boards, and hazardous materials (e.g., batteries and mercury-containing devices).
   - Segregated materials are transferred to specific workstations for further processing.

3. **Material Processing**:
    - **Metal Processing**: The metal crusher reduces metal components into manageable sizes for recycling.
    - **Plastic Shredding**: ABS processors grind plastic components for reuse.
    - **Cable Stripping**: The cable stripper recovers valuable metals like copper and aluminum from electrical wires.
    - **PCB Processing**: Printed circuit boards are dismantled and prepared for further extraction of valuable metals such as gold and silver.
4. **Storage of Hazardous Materials**:
    - Hazardous components like CRTs, batteries, and mercury-containing items are stored in specialized compartments to prevent environmental contamination.
5. **Preparation for Export**:
    - Non-recyclable or specialized materials (e.g., certain hazardous waste and rare earth metals) are packaged securely for export to certified international recycling facilities.
6. **Local Recycling and Sales**:
    - Recyclable materials, such as metals and plastics, are sold to local recyclers and manufacturers.
7. **Quality Control and Reporting**:
    - Regular inspection of processed materials to ensure compliance with quality standards.
    - Documentation of all e-waste handled, recycled, sold, and exported for transparency and regulatory compliance.

3.3.3 Description of Aesthetic and Environmental Considerations

The Crescent Future Kids (CFK) E-Waste Recycling Plant addresses the escalating challenge of electronic waste management by incorporating sustainable environmental practices. The Project involves upgrading and transforming an existing warehouse into a modern e-waste processing facility capable of efficiently handling, segregating, and recycling various types of electronic waste. The facility leverages advanced technology and complies with international Environmental, Health, and Safety Guidelines (EHSGs), specifically on hazardous materials management, ensuring minimal environmental and occupational risks.

- The facility will be designed to harmonize with the surrounding environment using standard materials externally and specialized compartments internally for safe and efficient operations.
- Dust, noise, and potential emissions from the facility will be managed through strict environmental protocols, such as dust suppression systems and noise barriers.

3.4 Hazardous Materials, Equipment and Storage on Site – Operational Health and Safety

The Crescent Future Kids (CFK) E-Waste Recycling Plant shall adhere to the hierarchy of controls in Occupational Health and Safety (OHS) to manage risks associated with hazardous materials and equipment. By prioritizing elimination, substitution, engineering controls, administrative controls, and PPE as the last resort, the facility ensures a safe working environment while aligning with best practices in environmental and occupational health.

3.4.1 Elimination

The facility is designed to minimize the presence of hazardous materials during operations:

- **Process Design**: The recycling process eliminates unnecessary handling of hazardous substances by incorporating automated systems for dismantling, shredding, and sorting electronic components.
- **Material Management**: Non-recyclable hazardous components, such as certain chemicals, are immediately isolated and prepared for transportation to certified hazardous waste disposal facilities.

3.4.2 Substitution

Whenever possible, safer alternatives are used to replace hazardous processes or materials:

- **Alternative Materials**: The facility avoids storing excessive quantities of high-risk substances such as flammable solvents and instead uses eco-friendly cleaning agents.
- **Safer Technology**: Traditional manual handling processes have been substituted with advanced equipment, such as CRT cutters and PCB processors, which minimize direct human contact with hazardous materials like lead and mercury.

3.4.3 Engineering Controls

The facility integrates advanced engineering controls to isolate and mitigate hazards:

- **Ventilation Systems**: High-efficiency exhaust systems remove airborne contaminants from areas where hazardous materials are handled, reducing exposure to toxic fumes.
- **Secondary Containment**: All storage areas for hazardous materials are equipped with spill-proof containment systems to prevent soil or water contamination in case of leaks.
- **Machinery Design**: E-waste processing equipment such as metal crushers, cable strippers, and balers are enclosed to minimize noise, dust, and accidental exposure.
- **Dust Suppression**: Water mist systems and enclosed conveyors are used to suppress dust during shredding or crushing operations, ensuring air quality compliance.

3.4.4 Administrative Controls

Operational procedures and policies are enforced to ensure safe practices and compliance with OHS standards:

- **Standard Operating Procedures (SOPs)**: Comprehensive guidelines are in place for material handling, waste segregation, and emergency response. These are reviewed and updated periodically to reflect the latest safety standards.
- **Staff Training**: Employees receive training on the safe handling of hazardous materials, emergency procedures, and compliance with Environmental, Health, and Safety Guidelines (EHSGs). Training is conducted at onboarding and refreshed regularly.
- **Workplace Signage**: Clearly visible signs are displayed throughout the facility to indicate hazardous zones, mandatory PPE use, emergency exits, and hygiene stations.
- **Restricted Access**: Hazardous material storage areas are accessible only to trained personnel authorized to handle such substances.
- **Emergency Preparedness**: Fire safety drills, spill response plans, and evacuation procedures are routinely practiced and updated.

3.4.5 Provision of Personal Protective Equipment (PPE)

As the last line of defense, the facility ensures that all workers are adequately equipped with high-quality PPE, which includes:

- **Mandatory PPE**:
  - **Head Protection**: Safety helmets to guard against falling objects.
  - **Eye Protection**: Safety goggles to shield against debris and toxic splashes.
  - **Respiratory Protection**: N95 or higher-grade respirators for workers exposed to dust or fumes.
  - **Hand Protection**: Nitrile gloves for handling corrosive or toxic substances.
  - **Foot Protection**: Steel-toed safety boots to prevent injuries from heavy objects.
  - **Body Protection**: Anti-static overalls to reduce the risk of electrostatic discharge when working with sensitive electronic components.
- **PPE Maintenance**: All PPE is inspected regularly, and worn-out or damaged equipment is immediately replaced. Workers are also trained in the proper use and storage of PPE to maximize its effectiveness.

3.5 Integration with EHSGs

The measures adopted by CFK align with Environmental Health and Safety Guidelines (EHSGs) for hazardous materials management by:

- Minimizing the storage of hazardous materials on-site and ensuring proper labelling and containment.
- Implementing rigorous controls for air, water, and soil pollution to mitigate environmental and human health impacts.
- Establishing procedures for the safe collection, segregation, and transportation of hazardous waste to certified facilities.
- The CFK facility strictly adheres to international EHSGs for hazardous materials management, such as guidelines for safe storage, handling, and transport.
- Additional safeguards include:
  - Noise control measures, including soundproofing machinery.
  - Dust suppression systems to prevent air pollution during shredding or crushing.
  - Water treatment systems to mitigate wastewater contamination from cleaning and processing operations.

By combining global EHSG principles with customized local safety protocols, the CFK e-waste processing facility ensures a safe, efficient, and environmentally responsible operation. It contributes to sustainable development by protecting public health, minimizing environmental impacts, and promoting the circular economy.

The CFK facility prioritizes eliminating hazards at their source and only relies on PPE as a supplemental safety measure. This approach ensures a safe, efficient, and environmentally sustainable e-waste recycling operation.

(a) Workspace Signage and Safety Measures

- **Signage**: Clear, visible signs indicating mandatory PPE use, emergency exits, handwashing stations, and segregation zones are installed throughout the facility.

- **First Aid Stations**: Easily accessible first-aid kits and spill response kits are strategically placed across the site.
- **Emergency Markers**: Zones for flammable or high-risk materials are distinctly marked and restricted to authorized personnel only.

(b)Implementation of Standard Operating Procedures (SOPs)

- **Training and Awareness**:
  - Comprehensive training sessions ensure staff understand safe handling procedures, emergency response protocols, and compliance with environmental standards.
  - Awareness campaigns highlight the importance of reducing occupational risks and maintaining hygiene.
- **Routine Inspections**:
  - Daily and periodic inspections ensure adherence to safety protocols and identify potential risks in material storage, handling, or processing.
- **Emergency Preparedness**:
  - The facility follows a detailed emergency response plan, including fire safety drills, spill containment procedures, and first-aid readiness, aligned with EHSG best practices.

(c) Specialized Equipment for E-Waste Processing

- **Machinery**: The facility utilizes advanced equipment designed to reduce worker exposure to hazardous substances, including metal crushers, PCB processors, and CRT cutters.
- **Maintenance**: Routine maintenance schedules ensure equipment operates efficiently and safely, preventing accidental leaks or breakdowns.

(d) Waste Segregation and Handling Protocols

- **Sorting**: E-waste is categorized into hazardous and non-hazardous components at the initial processing stage.
- **Hazardous Materials**: Items such as mercury lamps, lead-acid batteries, and CRTs are carefully packaged and shipped to certified hazardous waste disposal facilities that meet international standards.
- **Recyclables**: Non-hazardous materials like metals and plastics are processed for resale to local recyclers or reintroduced into the manufacturing supply chain.

(e) Entry and Exit Protocol for CFK E-Waste Plant

This protocol ensures controlled and secure access to the CFK E-Waste Plant while maintaining safety, environmental compliance, and operational efficiency.

A. Entry Protocol
Access Control Points:

- All entry points to the plant shall be controlled through manned security checkpoints and

electronic access control systems.

- A Visitor Management System (VMS) shall record details of all entrants.

Personnel Entry

- Only authorized employees, contractors, and visitors with pre-approved clearance shall be allowed entry.
- Employees must wear company-issued ID badges.
- Contractors must have a work permit, PPE (Personal Protective Equipment), and a signed compliance form.
- Visitors must register at the main security desk, provide identification, and receive a temporary visitor badge.

Vehicle Entry

- Employee and contractor vehicles must be registered and issued RFID access tags.
- Delivery vehicles shall undergo a pre-screening process to verify cargo.
- E-waste transport vehicles shall be subject to weighbridge verification before unloading.

Screening Procedures

All personnel and vehicles will undergo security screening, including:

- Metal detection for unauthorized equipment.
- Inspection for hazardous or prohibited materials.
- Radiation scanning for certain electronic waste.

B. Exit Protocol

Personnel Exit

- Employees and contractors must check out using biometric systems.
- Visitors must sign out at the security desk and return their access badge.
- Security personnel shall conduct random exit checks.

Vehicle Exit

- Waste transport vehicles must undergo a final check, ensuring:
- Proper documentation.
- Secure containment of hazardous materials.
- Employee and contractor vehicles shall be randomly inspected.

Material Movement Controls

- Electronic waste movement logs shall be maintained for compliance.
- Salvaged components for resale/recycling must be accompanied by an approved materials release form.

3.5.6. Plant Access Restriction System

To protect personnel, assets, and the environment**,** CFK E-Waste Plant will implement a multi-layered access restriction system.

A. Access Zoning

Green Zone – General Access Areas

- Reception, administrative offices, staff break areas.

- Access granted to all employees and registered visitors.

Yellow Zone – Operational Areas

- E-waste sorting, dismantling, and non-hazardous material processing zones.
- Access limited to trained employees and authorized contractors**.**

Red Zone – **Restricted Areas** (Hazardous Processing & Storage)

- Battery storage, chemical treatment areas, heavy machinery zones.
- Highly restricted**,** requiring specialized training and PPE.

B. Access Control Mechanisms

- **Biometric Scanners & RFID Cards**: Installed at all critical access points.
- **Surveillance Cameras**: Monitored 24/7 in the control room.
- **Security Patrols**: Routine inspections to ensure compliance.

3.6 Process and Technology

3.6.1 E-Waste Treatment and Recycling and Process

The process begins as the waste materials are brought to site. The various stages of the process are depicted below. The process will include waste collection from companies that request their e-waste to be collected, stored, dismantled, separated of streams, packaged and shipped for recycling.

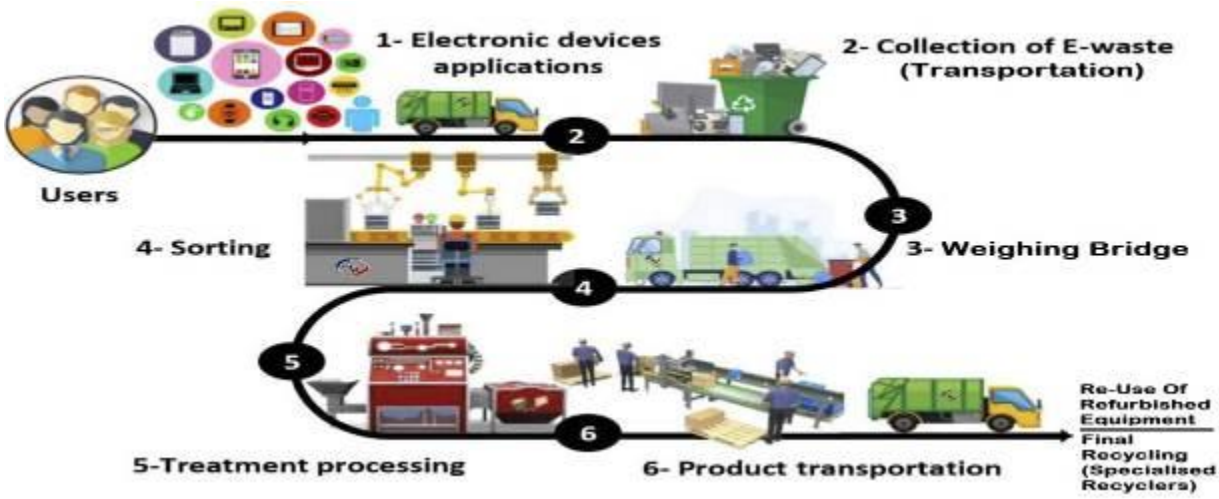


Figure 4: Recycling and processing during e-waste management.

3.6.2 Process & System Design for CFK E-Waste Plant

This section outlines process flows, key operational systems, and environmental controls.

A. E-Waste Processing Workflow

Collection & Transportation

- Secure collection from e-waste drop-off points.
- Transportation in sealed and labelled containers to prevent environmental contamination.

Weighing & Documentation

Weighbridge System to log material input for compliance and reporting.

Sorting & Dismantling

Manual and mechanical sorting into categories:

- Reusable components
- Hazardous materials (batteries, CRTs, mercury-containing devices)
- Shredable metals/plastics

Material Recovery & Hazardous Waste Treatment

- Non-hazardous materials: Sent for shredding and recycling.
- Hazardous components**:** Processed in isolation with protective measures.

Storage & Final Disposal

- Segregated storage for recyclable vs. non-recyclable materials.
- Safe disposal in compliance with ZEMA and Environmental Management laws.

B. Environmental & Safety Systems

- Air Filtration & Dust Control: Industrial-grade air filtration systems to minimize airborne toxins.
- Wastewater Management: Effluent treatment plant (ETP) for safe disposal of liquid waste.
- Fire & Chemical Spill Prevention: Fire suppression systems in all hazardous areas and spill containment measures with emergency response protocols.

C. Digital Monitoring & Compliance Reporting

- Automated Reporting System: Digital logs for tracking waste volumes, hazardous material movement, and compliance documentation.
- Real-Time Surveillance & Alerts**:** AI-based monitoring for early hazard detection**.**

3.6.3 Plant Sections

- **Storage**: Storage is done at two stages, the raw material, which is electrical and electronic waste equipment and the products which are stored by separating the streams into various types and isolated as: CRT Screens, Printed Circuit Boards (PCBs) and connectors, Copper, Aluminium and Iron Steel.
- **Dismantling:** Involves stripping cables using a cable stripper, cutting PCBs with a specialised CRT cutter, crushing plastic components with a jaw crusher. Metal components are dismantled manually.
- **Separation:** this involves manually isolating the various components of the waste stream and placing them in designated storage areas.
- **Packaging:** Cut PCBs are packaged in plastic bags and placed on insulated pallets to avoid leaching of heavy metals.

3.6.4 Equipment Type

Table 6: Equipment Details and Specifications

Equipment	Power (Kw)	Capacity (Kg/h)	Model	Additional Info
Dismantling Machine)	6.05	300-400	CJJ - 120	Dimension(L*W*H):1900 mm*1360 mm* 1800mm

				Temperature Range: 0-400°C (Adjustable) The main part of this system. Weight: 900 KG For the PCB Bare board and electronic components separation
Water Scrubber	5.5	200-300	PLS - II	The APC System: Designed to purify the flue gas and smell during the dismantling.
Water Scrubber		200-300	PLO - II	Provide a good working environment
Three In One Flue Gas Control Unit		200-300	LGG - II	Easily reach each the local government environmental protection policy.
Electrostatic Fume Purifier		200-300	JYJ - II	
Magnetic Separator	0.75	200-300	YCX - II	Remove the ferrous material from the components
Electronic Components Sorting Machine	0.12	300	YFS - II	Sorting out different kinds of chips
Conveyor Belt		300	PDS-500-4	
Shredding Machine	11	300	SZS-600	
Hammer Crusher	37	300	CP-600	
Air Flow Convey system	4.5		(FS-108)	
Grinding machine	55	300	MF-600	
Air Flow Separate Machine	3+3	300	QLS-600	
High Voltage Electrostatic separator	0.12+1.5+3+3+6		JDF-1500-II	
Screw conveyor	1.5		LS-133-3	
Pulse Dust Collector	5.5	500-600	MC-48	Metal and non-metal separating machine
Pulse Dust Collector	7.5		MC-60	
PLC Control Cabinet			DKG-II	

3.6.5 Recycling process

The recycling process for the CFK plant will begin at the disassembly line. Here, workers will remove the recyclable plastic or wooden case, metal chassis, yoke, PC board, wire and metal strap from the CRT. These materials will be all sorted for individual commodity sales. The resulting CRT is a whole glass tube (impregnated with lead) with an internal metal frame.

The CRTs are then loaded onto a conveyor system that leads into the CRT crusher. This self-contained unit allows for easy transportation, total weather protection, dust containment and complete air filtration.

Once the CRTs enter the crusher, they drop into a rotating hammer mill. The hammers hit the glass, causing the CRT to implode into pieces of glass and metal. A magnet pulls metal from the mix, and a screen is used to sift the glass to produce the desired size. Metals and crushed glass are separately

discharged from the bottom of the system into commodity containers for shipment. CFK sells virtually all materials from electronics to recyclers. Circuit boards are exported abroad where they are eventually ground up and smelted. The gasses from this process are captured and the resulting metals; lead, tin, gold, and palladium are sold as commodities. Plastics are grouped by and baled by colour and sold to plastics recyclers. Steel is sold to local metal scrap dealers.

3.6.5 Management of Printed Circuit Boards (PCBoardss) Storage and handling:

The cut PCBs will be packaged in sealed plastic containers. These will then be loaded on pallets and insulated with plastic wrapping to further seal the consignment in readiness for shipping. The packaged PCBs are then exported to our various designated partners for further and more sophisticated downstream recycling as highlighted above.

PCB Components dismantling Unit is used to remove the electronic components on different PCB boards, the machine body made of 6mm thickness 45 steel and its own special technology, which have the characteristics of high temperature resistance, abrasion resistance, safety and reliable, stable performance, high precision, durability. It is a necessary section for PCB recycling plant.

Working Process:

Figure 5: PCB Components dismantling stages

3.6.7 Pollution Control and Safety Measures

As highlighted above, PCBs and CRTs contain heavy metals such as Lead, Mercury. To prevent leaching of these metals, the recycling process employs various safety measures which include, non-metal residue producing cutters as highlighted above. Also, the crusher will be installed in a containerised plant which allows for easy transportation, total weather protection, dust containment and complete air filtration. Further the cut PCBs are stored in sealed plastic containers which are placed on insulated pallets. These measures ensure no heavy metal seeps to the environment.

General Safety measures will be employed including the use of safety wear like hand gloves, goggles and overcoats for plant employees. The crusher will be installed in a containment unit to contain dust and fume. In a quest to mitigate the impacts of lead, workers will be educated on occupational health safety (information about their occupation-related health hazards involved and self-protection, protective gear and equipment and assured periodic medical check-ups). When handling CRTs workers will ensure that no stress will be placed on the neck potion of the CRT as it is the most fragile potion of the device. As the CRT can still carry charge when display system is off the CRT should not be touch until properly discharged.

Other safety measures that will be taken are as follows;

1. Never work alone. Having someone nearby in case of an accident could save your life.
2. Turn off the power and disconnect the AC power cord before you remove the CRT cover.
3. Remove any metal jewellery
4. Remove the grounding wrist or heel strap until the CRT has been discharged.
5. Disconnect the snap fastener on the grounded workbench mat until the CRT has been.

3.6.8 Plant Capacity

The Crescent Future Kids (CFK) E-Waste Treatment and Recycling Plant is designed to process between **100 to 150 kilograms per hour**, translating to an estimated **1.0 to 1.5 tons per day** under optimal conditions. However, the current e-waste generation in the market significantly exceeds this capacity, with an estimated **5 tons of e-waste being generated daily**. This presents both an operational challenge and an opportunity for future expansion.

The CFK Environmental and Social Management Plan (ESMP) emphasizes sustainable and responsible e-waste management, ensuring that environmental, occupational health, and safety risks are mitigated while maximizing resource recovery. The current plant capacity is strategically aligned with the initial operational phase of the project, allowing for scalable growth while maintaining compliance with local and international environmental standards.

Challenges and Considerations

1. **Processing Limitations:**
    - The plant's current capacity may lead to stockpiling of e-waste beyond storage limits, increasing the risk of hazardous material exposure.
    - Extended lead times in processing may slow down the recycling chain, affecting overall efficiency.

2. **Market Demand and Supply Chain Management:**
    - The daily market inflow of **5 tons of e-waste** suggests a need for process optimization, enhanced machinery efficiency, or possible expansion of treatment facilities.
    - Strategic partnerships with bulk e-waste generators (e.g., government agencies, corporations, and telecom providers) could enable planned intake scheduling to avoid capacity overload.

3. **Expansion Considerations:**
    - The plant may require additional high-capacity shredders, crushers, automated sorting systems, and material recovery units to handle higher daily volumes.
    - Future investments in mechanized dismantling and separation technologies can enhance throughput without compromising quality and safety.
    - Expansion should be planned with a Lifecycle Impact Assessment (LCA**)** to evaluate long-term sustainability.

4. **Environmental and Occupational Health Compliance:**
    - Ensuring compliance with Zambia Environmental Management Agency (ZEMA) regulations and international best practices such as the Basel Convention on Hazardous Waste Management**.**
    - Occupational health and safety measures must be scaled accordingly to prevent overexertion of workers due to increased workload beyond plant capacity.

Recommendations for Future Scaling

- Conduct a feasibility study for **capacity expansion to at least 5 tons per day** within the next operational phase.
- Optimize process flows through automation and **introduce pre-sorting and bulk dismantling stations** to improve processing speed.
- Establish partnerships with recycling firms that can process **overflow e-waste** in collaboration with CFK.
- Implement an **e-waste inventory and forecasting system** to align intake with plant processing capability efficiently.

3.6.9 Production Components

The Project components include:

- Storage Space of about 200 square metres in extent. The storage yard requires no major expansion.
- The Crushing Bay will be 50 square meters in extent. This is the part where all crushing will be taking place. The crushing machine will be enclosed in a 26m³ shipping container to prevent release of toxic emissions from circuit boards and cathode ray tubes. All materials and workmanship to be in accordance with the requirements of the latest relevant Zambian standards and codes of practice.

3.7 Project lifecycle

The Project is expected to commence during the first quarter of the year, 2025 Projected over a three-month installation completion cycle. The Project is expected to be on-going.

3.8 Water supply

There is an available water supply using an onsite borehole which has the capacity of 10,000L/day to provide adequate supply to meet the Project demand.

3.9 Sanitation

All grey water and sewerage are channelled to the septic tank because the site is not currently connected to a public sewer line.

3.10 Electricity supply

Electricity supply is from the existing ZESCO overhead supply main. All electrical installations are in accordance with Institute of Electrical Engineers regulations and ZABS standards.

3.11 Firefighting systems

The design of firefighting services, including Fire Hose Reels, Portable Fire Extinguishers, and Fire Hydrants, will be based on the *Local Administration (Fire Services) Regulations 1991* and *ZS 361 – Water Supply Systems – Demand Figures for Design – Guidelines*. These regulations and guidelines provide accurate and detailed requirements for the location and duty of firefighting equipment tailored to the specific needs of buildings such as the CFK Electronic Waste Management plant.

Types of Fires and Applicable Firefighting Equipment:

1. **Class A Fires** (Ordinary Combustibles: Wood, Paper, Plastics, Fabric)

Description: These fires involve materials such as packaging, paper waste, and plastic components found in electronic waste.

Recommended Fire Extinguishers:

- **Water Fire Extinguishers (stored pressure type)** – Most effective for ordinary combustibles like paper, plastic, and fabrics.
- **Foam Fire Extinguishers** – Suitable for large-scale plastic or paper fires that might involve liquids or larger waste.
- **Fire Hose Reels:** Located near areas where electronic waste is stored in bulk or where combustible materials like packaging materials are found.

2. **Class B Fires** (Flammable Liquids: Oil, Solvents, Paint, Electronic Cleaning Fluids)

   Description: These fires involve flammable liquids such as oils or solvents used in the cleaning and dismantling of electronic waste components.

Recommended Fire Extinguishers:

- **Foam Fire Extinguishers (AFFF type)** – Effective for tackling fires in oil or solvent storage and areas where liquid chemicals are used.
- **CO2 Fire Extinguishers** – Best for electrical fires that might occur during the cleaning or dismantling of electronic components.
- **Fire Hose Reels:** Positioned near areas where solvents or oils are stored or used (e.g., electronic disassembly stations, cleaning areas).

3. **Class C Fires** (Flammable Gases: Propane, Butane, Hydrogen)

- **Description:** These fires involve gases that could be used or produced during the dismantling of electronic waste, particularly in the presence of compressed gas cylinders or leaks.

Recommended Fire Extinguishers:

- **CO2 Fire Extinguishers** – The CO2 extinguisher works effectively on gas fires because it does not leave residue and suffocates the flames by displacing oxygen.
- **Dry Powder Fire Extinguishers** – Suitable for quickly suppressing gas fires, including in areas where gas might be leaking.
- **Fire Hose Reels:** Installed near areas with flammable gas cylinders or gas supply lines for the safe and quick suppression of any leaks or fires.

4. **Class D Fires** (Flammable Metals: Magnesium, Titanium, Lithium, and Other Metals in Electronic Waste)

Description: These fires involve flammable metals, which may be present in certain electronic components, such as batteries (e.g., lithium-ion batteries) and circuit boards.

Recommended Fire Extinguishers:

- **Dry Powder Fire Extinguishers (Class D)** – Specifically designed for metal fires. The powder will help to suppress the fire by forming a barrier and cooling the metal.
- **Fire Hose Reels:** Typically, not suitable for Class D fires, as the use of water or foam could exacerbate the situation. Dry powder extinguishers are the preferred method.

5. **Class E Fires** (Electrical Fires: Electrical Panels, Wires, Circuit Boards, Batteries)

Description: These fires are caused by malfunctioning electronic components, such as circuit boards, electrical panels, or batteries (especially in electronic waste processing).

Recommended Fire Extinguishers:

- **CO2 Fire Extinguishers** – Ideal for electrical fires because CO2 is non-conductive and does not leave any residue that could damage sensitive equipment.
- **Dry Powder Fire Extinguishers** – Suitable for electrical fires, as the powder can prevent the fire from spreading and cool down overheated components.
- **Fire Hose Reels:** Not recommended for electrical fires due to the risk of electrocution. CO2 or dry powder extinguishers should be used.

6. **Class F Fires** (Cooking Oils and Fats)

Description: Although less likely, this type of fire could occur in areas where food is prepared or cooked on-site (e.g., staff kitchens in the plant).

Recommended Fire Extinguishers:

- **Wet Chemical Fire Extinguishers** – Specifically designed for cooking oil and fat fires. This type of extinguisher suppresses the fire while preventing re-ignition.
- **Fire Hose Reels:** Not applicable for use with cooking oil or fat fires, where specialized wet chemical extinguishers are required.

Firefighting Equipment Placement and Access:

Portable Fire Extinguishers will be strategically placed at key locations, such as:

- Waste storage areas (combustible materials)
- Dismantling and cleaning stations (flammable liquids)
- Areas with electrical panels, batteries, and sensitive equipment (electrical fires)
- Gas storage or processing areas (flammable gases)

Fire Hose Reels will be positioned at the plant's entrance, near the main processing areas, and near any high-risk zones like waste storage or chemical handling areas.

Water Supply for Firefighting:

- A minimum of **400 litres** of water will be stored on-site in elevated water tanks to cater to firefighting requirements, ensuring an adequate supply for smaller-scale or initial firefighting actions.
- This water supply meets the industrial minimum of **383l/s** for firefighting purposes, in compliance with the relevant fire safety regulations.

Maintenance and Inspections:

- All firefighting equipment will undergo regular inspection and maintenance according to manufacturer guidelines. This includes ensuring that fire extinguishers are properly charged, fire hose reels are functional, and water storage systems are fully operational.
- Staff will be trained in the proper use of firefighting equipment, and regular drills will be conducted to ensure readiness in case of an emergency.

3.12 Project Phases and Associated Activities

The CFK Electronic Waste Management Plant project will be implemented in four key phases: **Pre-Installation, Installation, Operation and Maintenance, and Decommissioning**. Each phase comes with specific environmental and social risks, requiring targeted management strategies.

3.12.1 Pre-Installation Phase

This phase involves planning, permitting, site assessment, and preliminary preparations before construction and expansion begin.

Key Activities

1. **Planning and Permitting**
    - Conduct a facility assessment to evaluate current infrastructure, operational capacity, and workflow.
    - Secure necessary permits and approvals from ZEMA and other relevant regulatory authorities.
    - Develop a detailed expansion and implementation schedule.
2. **Site Clearance and Preparation**
    - Reconfigure the existing plant layout to accommodate new processing equipment.
    - Upgrade utility infrastructure, including power supply, water, and drainage systems.
    - Install machinery foundations and ensure structural reinforcements.
3. **Environmental and Social Risks**
    - **Potential Risks**: Soil contamination, disruption of surrounding areas, improper waste handling.
    - **Mitigation Measures**: Conduct environmental impact assessments, implement pollution control measures, and develop an enhanced waste management plan.
4. **Safety & Risk Management**
    - Conduct a safety risk assessment and update safety protocols.
    - Train workers on new equipment operations and emergency response plans.
    - Upgrade fire safety measures and Personal Protective Equipment (PPE) requirements.

3.12.2 Installation Phase

This phase will involve modifications and improvements to existing infrastructure to accommodate advanced e-waste processing equipment.

Key Activities

1. **Infrastructure & System Upgrades**
    - Upgrade electrical systems and introduce energy-efficient technologies.
    - Enhance ventilation, air quality, and dust suppression systems.
    - Install RFID-based access control and expansion CCTV surveillance for security.
2. **Equipment Installation & Testing**
    - Install advanced machinery such as automated disassembly, electrostatic separation, and rare-earth metal recovery units.
    - Conduct trial runs and system calibration for operational efficiency.
3. **Environmental and Social Risks**

- **Potential Risks**: Noise pollution, increased energy consumption, potential hazardous emissions.
- **Mitigation Measures**: Use noise-dampening technology, energy-efficient systems, and upgraded air filtration units.

3.12.3 Operation and Maintenance Phase

During this phase, the plant will function at full capacity, with continuous monitoring and optimization of processes.

Key Activities

- Marketing, promotions, and stakeholder engagement.
- Collection, storage, and dismantling of e-waste.
- Sorting, separation, and recycling of various electronic components.
- Selling of scrap metal and shipping circuit boards for further recycling.
- CRT (Cathode Ray Tube) Processing, separating glass and metal for recycling.

Environmental and Social Risks

- **Potential Risks**: Occupational hazards, improper waste handling, chemical spills, fire risks.
- **Mitigation Measures**: Implement strict safety protocols, provide ongoing training for workers, use automated sorting systems to reduce human exposure, and ensure proper hazardous waste disposal.

3.12.4 Decommissioning and Closure Phase

This phase will involve dismantling, selling reusable parts, and restoring the site to its natural state.

Key Activities

- Dismantling and selling equipment to other companies.
- Excavation of contaminated soil (if any) and disposal through a ZEMA-approved contractor.
- Demolition of built structures (main office, worker's block, guard house).
- Land restoration, tree planting, and removal of all construction waste off-site.

Environmental and Social Risks

- **Potential Risks**: Waste mismanagement, soil and water contamination, worker exposure to hazardous materials.
- **Mitigation Measures**: Safe dismantling procedures, proper waste disposal through licensed contractors, and effective land rehabilitation strategies.

4.0 PROJECT ALTERNATIVES

4.1 Need for the Project

Zambian is party to a number of international conventions and treaties like the Basel convention, which recognize the need to handle electronic waste in a sustainable manner. Current efforts are underway to align local regulations and hence build capacity in the management of electronic waste. This Project

represents an effort in helping the nation move forward with regards to the sustainable handling of electronic waste.

4.2 Site Alternatives

The site chosen for installation of the plant belongs to the developer, hence no other alternative was considered. Advantages of this site include

- The already existing warehouse Project, which makes the Project cheaper.
- The house on site is already used for the purpose of electronic waste processing.

4.3 Site Technologies

4.3.1 Materials

The common disposal technology for waste in Zambia is by landfill. However, electronic waste contains hazardous materials which cannot be disposed in general landfills. This Project presents a sustainable way of disposing of hazardous materials found in electronic waste. The Project proposes handling the hazardous materials in electronic waste by separating them from the electronic equipment and reusing the components that can be reused but also exporting for recycling components which contain heavy metals like printed circuit boards and cathode ray tubes.

4.3.2 Plant design

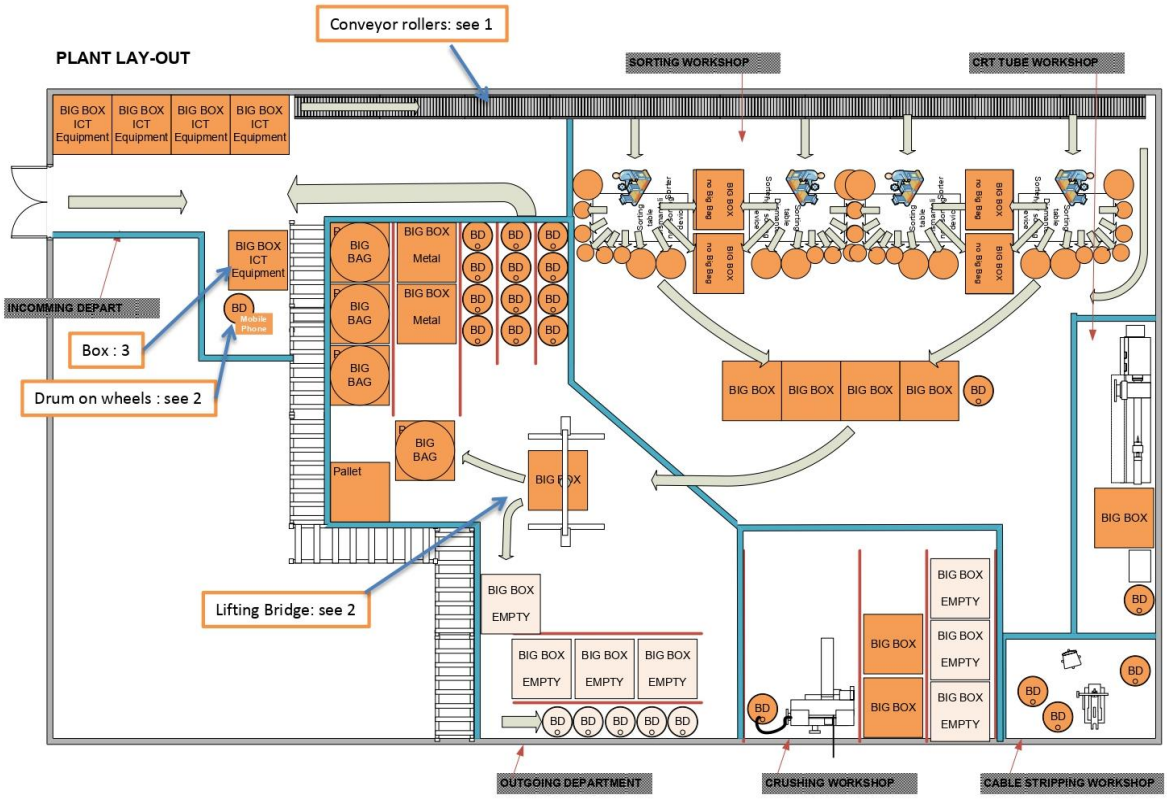


Figure 6: Plant design

Design alternatives:

1. Separated process components: this involves having the various units of the plant in separate locations or sites, which increases risk of contamination over a wide area and has higher costs.
2. Compact plant in one space: this involves utilising a single space or site and have all plant components located there. This reduces the risk of contamination as the controls will be more effectively monitored in one place.

The developer chose the second alternative because it is easy to manage the various processes in one location.

4.4 Water Supply

Available options for water supply include borehole and Lusaka water supply. Of the two, an onsite borehole is preferred as the site already has a borehole drilled. The borehole has a capacity which is adequate for the Project needs, 10,000L/day of water.

4.5 Sewerage Management

Available options for Sewer management are the Lusaka Water Supply and Sanitation Company and the septic tank. The septic tank will be utilised on this site as the site is currently not connected to a public sewer line.

4.6 Electricity Supply

The primary electricity supply for the CFK Electronic Waste Management Plant will be sourced from the existing **ZESCO overhead supply main**. All electrical installations will comply with the **Institute of Electrical Engineers regulations** and **ZABS standards** to ensure safety and efficiency.

To enhance energy reliability and reduce operational downtime, the facility will be equipped with a **backup power system**, including:

- **Solar Power Backup** – A renewable energy system with battery storage to support essential plant operations during power outages.
- **Diesel Generator** – A standby generator will be available to supplement the power supply in case of prolonged ZESCO outages or periods of high energy demand.

The integration of **solar energy** aligns with the plant's sustainability goals, reducing dependency on fossil fuels and lowering the facility's carbon footprint.

5.0 DESCRIPTION OF THE BASELINE ENVIRONMENT

The proposed site for the **CFK Electronic Waste Management Plant** is located in **Makeni, Lusaka Province**. The project will be developed on a **2,600-square-metre** plot of land. The site's GPS coordinates are **35L0631637 UTM 8291848**.

The surrounding area consists of **industrial buildings** and **a few residential homes**, requiring appropriate buffer zones to ensure safety and environmental compliance. The boundary distances to nearby structures are as follows:

Figure 7: Google Map Location and Landmarks

- **West**: Satwant Transport Limited, an international transport company, is located approximately 650 metres from the CFK plant.
- **North-West**: A warehouse facility is situated at a distance of 200 metres off.
- **East**: A male accountant's residential property is positioned 60 metres away.
- **South-East**: A female tutor's residence is located 70 metres from the plant.
- **South**: Other industrial warehouses and factories are within a range of 250 - 300 metres from the site.

A **minimum buffer zone of 50 metres** will be maintained between the plant and residential properties to minimize potential environmental and social impacts such as noise, dust, and emissions. Additionally, mitigation measures, including **landscaping, noise barriers, and emission control systems**, will be implemented to enhance safety and environmental protection.

Figure 8: The site baseline environment Showing the Buffer Zone

5.1 The Climate

Although the Project area is located in the tropics, the climate is modified by altitude and distance from the coast. The Project site has three distinct seasons, a cool dry season from mid-April to August, a pre rains hot season from September to October and a rainy season from November to April.

Lusaka Province receives an annual rainfall in the region of 500 to 1000mm, with a mean annual rainfall of 800mm. The months of December, January and February receive over 70% of the rain for an entire year.

Temperatures are moderate; mean monthly temperatures range between about 15 ^{o}C in the cold season to about 30^{o}C in the hot season when humidity is comparatively high. The Project site is dominated by prevailing easterly winds, during the dry season fresh winds are experienced in the months of July and August. The rainy season experiences light variable winds predominantly northerlies and north and easterlies in January and February.

5.2 Air Quality and Noise

With the site's location away from the commercial area, field observations indicate that despite the commencement of expansion preparation activities, the general air quality in the area is fairly good. However, seasonal variations as well as localized and temporary deterioration in air quality are experienced

5.3 Hydrogeology and Drainage

Table 7: UNZA Physical/Chemical Examination of Water Laboratory Results

Parameter	Test Result	WHO Standard	Analysis
pH Level	7.44	6.5 – 8.5	Optimal, within acceptable range
Turbidity (NTU)	0.21	< 5.0	Excellent clarity, well within limits
Total Dissolved Solids (TDS) (mg/L)	681	< 1000	Acceptable, indicating moderate mineral content
Total Suspended Solids (TSS) (mg/L)	<1.0	< 5.0	Very low, water is clear
Electrical Conductivity (µS/cm)	1362	< 1500	Slightly high, but within limits
Total Hardness (as mg $CaCO_3$/L)	376	100 – 500	Hard water, may require softening for certain applications
Calcium Hardness (as mg $CaCO_3$/L)	360	-	High, indicating potential scaling issues
Alkalinity (as mg $CaCO_3$/L)	372	20 – 200	Above typical range, may affect corrosion control
Iron (mg/L)	<0.0001	< 0.3	Extremely low, no risk of coloration or metallic taste
Ammonia (as NH_4-N mg/L)	0.6035	< 1.5	Safe, but indicates possible organic material presence
Sulphates (mg/L)	87.869	< 250	Within acceptable range
Chlorides (mg/L)	165.0	< 250	Acceptable, but on the higher side
Nitrates (as NO_3-N mg/L)	21.803	< 50	Well within safe limits

Nitrites (as NO_2-N mg/L)	0.0123	< 1.0	Well within safe limits
Acidity (as mg $CaCO_3$/L)	Nil	-	No acidity detected
Total Phosphates (mg/L)	<0.0001	< 5.0	Negligible levels detected
Magnesium (mg/L)	3.84	-	Low, contributes minimally to hardness
Calcium (mg/L)	144.0	-	High, contributes to water hardness
Fluorides (mg/L)	0.12	< 1.5	Well within safe limits
Potassium (mg/L)	35.94	-	Natural mineral presence, no risk
Sodium (mg/L)	108.90	< 200	Acceptable, but relatively high
Manganese (mg/L)	<0.001	< 0.1	Negligible, no staining issues expected

Table 8: Bacteriology Results

Bacteriological Parameter	Test Result	WHO Standard	Analysis
E. coli (#/100ml)	0	0	Safe, no contamination detected
Total Coliforms (#/100ml)	42	0	Presence of bacteria indicates potential contamination
Fecal Coliforms (#/100ml)	19	0	Presence indicates organic contamination source

Analysis of Water Results

1. **No natural water bodies on site**
   The **project site does not have any rivers, streams, or permanent bodies of water**. Water is sourced from boreholes, requiring assessment for quality and safety before use.
2. **Reasons for installing filters**
   Based on the UNZA laboratory analysis, the following factors influenced the decision to install water filtration systems at the facility:
   - **Hard Water & Scaling Issues**:
     - The **total hardness (376 mg $CaCO_3$/L)** and **calcium hardness (360 mg $CaCO_3$/L)** indicate **very hard water**, which can lead to scaling in pipes and machinery.
     - To address this, a **water softening system** has been installed to prevent buildup in processing equipment.
   - **Alkalinity & Corrosion Risk**:
     - The **high alkalinity (372 mg $CaCO_3$/L)** suggests the potential for **corrosion and scaling** in plumbing systems.
     - Filtration and pH balancing systems help **neutralize excessive alkalinity**, improving water stability.
   - **Bacteriological Contamination**:
     - **Total coliforms (42/100ml) and fecal coliforms (19/100ml)** indicate some level of bacterial contamination.
     - Although **E. coli was not detected**, the presence of coliforms suggests a possible contamination source from soil or decaying organic matter.
     - A **UV disinfection system and chlorination** have been installed to ensure microbial safety.
   - **Chloride & Sodium Levels**:

- **Chlorides (165 mg/L)** and **sodium (108.9 mg/L)** are relatively high but within acceptable limits.
- Although safe for consumption, these levels may impact taste, making additional filtration beneficial.

3. **Installed Filtration System**
    - **Water Softening System** – To reduce hardness and prevent scaling.
    - **Reverse Osmosis (RO) System** – To remove excess minerals and improve taste.
    - **UV & Chlorination Treatment** – To eliminate microbial contamination.
    - **Sediment & Carbon Filters** – To improve clarity, remove odors, and enhance water quality.

These interventions ensure the water is safe, clear, and compliant with WHO drinking water standards**,** suitable for both industrial and domestic use within the facility and establish a baseline environment for heavy metal contamination.

5.3.5 Surface Water

The ground is generally flat with drainage channels. There is no stream or other surface drainage feature in the area. As such runoff drains via natural drainage channels.

5.3.6 Ground Water

The main water yielding level is generally found between 27 and 40 meters, a depth at which solution cavities are apparently particularly well developed. Because water is found very deep, the groundwater quality is good as the rocks filter any effluent released to the environment.

5.4 Topography

The Project site is relatively flat with an elevation of 1269 to 1270m. There are no hills or mountains present in the area around or on the site.

5.5 Geology and Soils

5.5.1 Soil Analysis Report

The soil analysis was conducted to establish **baseline environmental conditions** at the Crescent Future Kids Limited (CFK) project site prior to full-scale operation of the e-waste recycling facility. The assessment focused on soil pH and potential contamination by heavy metals commonly associated with electronic waste activities.

SAMPLING AND TESTING OVERVIEW

- **Samples:** Four soil samples (A, B, C, and D) collected from different points within the project site (See Appendix X)
- **Testing Standard:**
  Tests were carried out in conformity with *Standard Methods for the Examination of Water and Wastewater (APHA, 1998)*
  Soil Analysis Report_CFK
- **Analytes Tested:**
    - pH
    - Barium (Ba)
    - Lead (Pb)
    - Copper (Cu)
    - Cadmium (Cd)
    - Mercury (Hg)

- Chromium (Cr)

SUMMARY OF KEY RESULTS (See Appendix X)

Soil pH

- pH values ranged from **7.51 to 7.74**
- Interpretation:
  - The soil is **slightly alkaline**
  - This range is typical for Lusaka soils and is **suitable for industrial use**
  - No abnormal acidity or alkalinity was detected

Heavy Metal Concentrations

All tested heavy metals were either **below detection limits** or present at **very low concentrations**:

Parameter	Result Range	Interpretation
Barium	< 0.01 ppm	Below detection limit
Lead	< 0.01 ppm	Below detection limit
Copper	< 0.003 ppm	Below detection limit
Cadmium	< 0.0002 ppm	Below detection limit
Mercury	< 0.0002 ppm	Below detection limit
Chromium	< 0.01 ppm	Below detection limit

These values indicate **no detectable soil contamination** from heavy metals typically associated with e-waste activities

ENVIRONMENTAL INTERPRETATION

- The site **does not show any evidence of pre-existing heavy-metal contamination**.
- All measured parameters fall well within acceptable environmental and occupational safety thresholds.
- The results establish a **clean baseline condition**, which is critical for:
  - Environmental monitoring
  - Future compliance audits
  - ESMP and EHPMP reporting
  - World Bank and ZEMA inspections

IMPLICATIONS FOR THE CFK E-WASTE PROJECT

Based on the laboratory findings:

1. The CFK site is **environmentally suitable** for the establishment and operation of an e-waste recycling facility.
2. No soil remediation is required at this stage.
3. The results support CFK's commitment to **preventive environmental management**, ensuring that future operations will not degrade soil quality.
4. The data provides a **baseline reference** against which future environmental monitoring results can be compared once the facility becomes operational.

CONCLUSION

The soil analysis confirms that the Crescent Future Kids Limited project site is **free from significant heavy-metal contamination** and is environmentally sound for the intended e-waste recycling activities. Continued implementation of CFK's Environmental and Social Management Plan (ESMP) and adherence to EHS controls will ensure the site remains compliant throughout the project lifecycle.

5.5.2 Analysis of Geology

The area is characterized by the **Katanga Supergroup**, which includes three geological formations: **Chunga, Cheta, and Lusaka Dolomite**.

- **Chunga Formation**: Composed of quartzites, schists, flaggy psammites, and calcareous rocks, with **quartz-muscovite-biotite schist** being the predominant rock.
- **Cheta Formation**: Contains calcareous rocks, dolomitic limestones, and schists, primarily **fine-grained quartzite-muscovite schist** and **muscovite-chlorite schist**.
- **Lusaka Dolomite Formation**: Consists mainly of **dolomite and limestone**, similar to the Cheta Formation but with minimal shale content.

Overlying the Katanga rocks are quaternary to recent deposits of alluvial and colluvial sediments, including calcareous tufa, pisolitic laterite**,** quartz-gravel, and sandy clays**.** These soils have moderate permeability, meaning that while some leaching of contaminants is possible**,** the presence of clay and carbonate-rich materials reduces the rapid seepage of heavy metals into groundwater. However, continuous exposure to pollutants could lead to localized contamination**,** particularly in areas with fractured dolomite or high permeability zones. To prevent soil and groundwater contamination, mitigation measures have been indicated in Section 6, 7 and 8 of this document.

By implementing these mitigation strategies, the risk of heavy metal contamination in soil and groundwater has been significantly reduced, ensuring compliance with ZEMA environmental guidelines**.**

5.6 Ecological Resources

Fauna

Fauna species observed included; Lizards, no birds were seen on seen on site. No fauna of significance importance exists on the site, although rats, bats, frogs, birds and some lizards are to be expected. There was no evidence on the site or the area surrounding it of the presence of any species of fauna that could be classified as endemic to the area or of special scientific value.

Flora

The vegetation on site is characterized by ornamental mango trees, a tomato garden, ornamental grass and flowers and acacia plant along the driveway. No rare or endangered tree species were identified on site.

Figure 9: Vegetation on site

5.7 Existing infrastructure

The existing infrastructure in the area includes;

- Powerlines for ZESCO.
- Road network (Los Angeles Road)
- Other Industrial and a few Residential units
- Shopping Centre along the road.
- Onsite water and sewage system
- Various Industrial holdings

5.8 Socio-Economic Environment

5.8.1 Land Use in the Project Area

Most of Makeni area was once used for farming activities. With the growing population of Lusaka, the area has lost most agricultural land to residential and commercial developments. As such the land use is mixed with pockets of farm activities noticeable on certain homesteads.

5.8.2 Population and Settlement

The **Kanyama Constituency**, where the project is located, has experienced significant population growth over the years. According to the **2022 Census of Population and Housing** conducted by the **Zambia Statistics Agency (ZamStats)**, Kanyama Constituency now has a total population of **525,902**, comprising **256,862 males** and **269,040 females**. As the population density rises, urban planning efforts, infrastructure development, and environmental management measures will be crucial to ensuring sustainable growth while minimizing the impact of industrial and commercial activities in the area.

5.8.3 Available Labour and Skills

The unemployment levels among youths in the Project area lends itself to the fact that most if not all unskilled and semi-skilled workers required for the Project can be sourced from within Makeni for both expansion and operation. Semi-skilled and unskilled labour is available in abundance in surrounding areas.

5.8.4 Economic Activities

The major economic activities surrounding the Project area are both commercial and small-scale businesses and industrialisation.

5.8.5 Transport / Communication

The Project site is well serviced by internal tar roads within Lusaka which connect it to other towns within the province and the rest of the country. The site has good reception for the three mobile cell networks (Airtel, MTN and ZAMTEL).

5.8.6 Cultural / Historical / Archaeological Sites

There are no known sites on the Project site or surrounding sites that have been confirmed as cultural or archaeological sites.

6.0 ENVIRONMENTAL & SOCIAL RISKS, IMPACTS & MITIGATION MEASURES

6.1 Positive Impact

The development and expansion of this **E-Waste Management Plant** will generate numerous **social, environmental, and economic benefits** during the different project phases.

6.1.1 Employment Creation

- **Preparation and Installation Stage**: Over **20 workers** will be employed in machine installation, civil works, and other specialized contracting roles during the **site preparation, construction, and commissioning phases**.

- **Operation Stage**: Once operational, the plant will create **over 20 full-time jobs**, providing stable employment opportunities in waste management and recycling.

6.1.2 Environmental Protection & Climate Change

- Reduction of E-Waste Pollution**:** By diverting electronic waste from landfills, the plant will minimize toxic leachate and heavy metal contamination of soil and groundwater, contributing to a cleaner environment**.**
- Air Quality Improvement: Proper handling, dismantling, and recycling of hazardous e-waste components will prevent air pollution caused by improper burning of electronic waste, which releases toxic fumes and greenhouse gases.
- Carbon Footprint Reduction: Recycling electronic components reduces the need for mining and manufacturing raw materials, significantly cutting carbon emissions and preserving natural resources.
- Sustainable Waste Management**:** The plant will promote a circular economy by recovering and reusing valuable materials like copper, aluminum, and precious metals, reducing demand for new resource extraction.

6.1.3 Human Health Benefits

- Reduction of Health Hazards: The project will eliminate unsafe disposal practices, reducing exposure to lead, mercury, cadmium, and other toxic substances known to cause neurological disorders, respiratory diseases, and cancer.
- Safer Working Conditions: Workers will be trained in proper handling of hazardous materials and equipped with protective gear, ensuring a safe and regulated work environment.
- Cleaner Living Conditions for Communities: The removal of e-waste from illegal dumpsites and residential areas will reduce vector-borne diseases and prevent contamination of local water sources**.**

6.1.4 Economic and Social Benefits

- Increased Revenue for the Nation: The sale of recycled materials and by-products will generate revenue, contributing to government taxes and economic growth**.**
- Corporate Social Responsibility (CSR)**:** The company will actively support community clean-up programs, raise awareness about responsible e-waste disposal, and promote sustainability education in local schools and organizations.

By integrating environmental sustainability, economic growth, and public health protection, this project will make a substantial contribution to Zambia's green economy and climate resilience efforts.

6.2 Negative Impact during Expansion

6.2.1 Air and Noise Pollution

Given the fact that the site for the proposed Project is partly developed, there will be minor earthworks to be undertaken in order to establish required levels. It is expected that the Project will result in the emission of dust or noise during the Preparation and Installation Phase from delivery vehicles and machinery.

6.2.2 Ground and Surface Water Pollution

Potential sources of ground and/or surface water resources contamination during expansion include:

- Workers domestic sewage.
- Run-off and contamination from expansion and other solid waste that will be produced on site and can pollute ground or surface water during periods of rainfall.

There will be no major potential sources of soil and ground water contamination on the site such as storage facilities for raw materials, specifically associated with the installation of the Plant. In addition, the volume of water to be used for expansion is very small and will have a negligible impact on the local water supply.

6.2.3 Vegetation and Habitat Risks

The expansion of the plant may result in loss of vegetation. The preparation and Preparation and Installation Phases of the Project will result in the disturbance of existing habitats on site. There are no endangered habitats in this area.

6.2.4 Traffic and Road Safety Risks

On-site traffic is generally expected to be limited to few heavy and light vehicles, including workers' transportation. The Project area is partly served by a tarred road. Additional impacts on general traffic congestion are considered insignificant. Therefore, impact on road safety in the vicinity is insignificant.

6.2.5 Occupational Health and Safety Risks

The expansion works will involve activities and procedures with potentially high-risk levels to the occupational health and safety of workers and personnel. These include:

- Movement of traffic and machinery around the site
- Working in confined spaces (e.g. trenches, sheds)
- Work with open flames (e.g. welding) and cutting operations
- Work in dusty environment
- Work at height (e.g. scaffolding and roofs, platforms and structural steel)
- Potential use of explosives (e.g. during excavation of trenches for drainage and foundations) although not likely.

Strict adherence to safety measures and procedures will minimise (or eliminate) risks of accidents or hazardous developments occurring.

6.2.6 Public Health and Safety Risks

Potential contamination of water resources can be of public health concern; however, the Project is located far enough from water courses and appropriate measures will ensure potential impacts are minimised or insignificant.

Expansion labour will commute to the site daily and common scenarios associated with social interactions amongst expansion workers and local communities which can lead to casual or commercial sexual relationships producing an inherent increased risk of the incidences of sexually transmitted infections (STIs) and HIV will not arise.

6.2.7 Land Use/Aesthetics Risks

The Project is compatible with the general plan of development in the area. Implementation of the Project will not result in the loss of useful land. The Project is a high class eco-friendly and humanely designed development which will have an enhancing effect to the built environment in this area.

6.2.8 Soil erosion and Land Degradation

During the Preparation and Installation Phase, soil erosion could occur from vegetation clearing and earth works. The processes involved in site preparation and expansion will loosen the soil which might lead to soil erosion and land degradation especially if expansion work is conducted during the wet season when soils are generally loose. Improper drainage of runoff from the road can also cause erosion, and lead to sediment loading in the water courses.

6.3 Negative Impact during Operation

6.3.1 Air and Noise Pollution

Impacts on Air quality

Emissions to the atmosphere which have the potential to impact on air quality are generated at various stages of the recycling process.

Fugitive dust emissions:

Fugitive dust emissions can arise from the handling and storage and processing of materials which will include stockpiling and retrieval of materials and vehicular haulage traffic on unpaved access roads. Fugitive dust will also arise from exposed surfaces in and around the factory if good housekeeping practises are not in place. Fugitive dust releases normally only lead to local nuisance problems.
Efficiency of these systems is such that, provided equipment is properly operated and maintained, levels of dust emitted to the atmosphere via exhaust gases will be insignificant.

Gaseous emissions:

There are various health risks associated with Tin or Lead inhalation, further there is a possibility of inhalation of mercury, beryllium and/or brominated dioxin. An example is polycyclic aromatic hydrocarbons (PAHs), dioxins and furans (persistent organic pollutants) which are generated when electronic waste is burnt. Further cutting of PCBs results in fines which may be carried in the air.

Given the small scale of the factory, potential impacts arising from the production of products are considered and will be mitigated by putting in place measures such as safety masks and safe containment of components with heavy metals.

Heavy Metals

Electronic Equipment contains a small amount of heavy metals. The type and sources are highlighted in the table 9 below.

Table 9: List of heavy metals and other metals

Heavy metals and other metals:	
- Arsenic	Small quantities in the form of gallium arsenide within light emitting diodes
- Barium	Getters in CRT
- Beryllium	Power supply boxes which contain silicon-controlled rectifiers and x-ray lenses
- Cadmium	Rechargeable NiCd-batteries, fluorescent layer (CRT screens), printer inks and toners, photocopying-machines (printer drums)

- Chromium VI	Data tapes, floppy-disks
- Lead	CRT screens, batteries, printed wiring boards
- Lithium	Li-batteries
- Mercury	Fluorescent lamps that provide backlighting in LCDs, in some alkaline batteries and mercury wetted switches
- Nickel	Rechargeable NiCd-batteries or NiMH-batteries, electron gun in CRT

These heavy metals may accumulate in the environment thereby posing health risks especially to children. The Project will result in the recycling of most of these components to prevent indiscriminate release of heavy metals.

Impacts on Noise Levels

The operation heavy machinery can result in considerable noise being given off; therefore, it is anticipated that the noise from the factory will cause minimal nuisance.

6.3.2 Ground and Surface Water Resources Pollution

A fair amount of sewage will be generated during operation but discharged into the septic tank. It is envisaged that the impact on the water table and availability of groundwater to other users due to this will be small. The building operations will also generate refuse, which if not collected and disposed of appropriately, can result in contamination of water resources downwards of the site especially in periods of rainfall. Proper waste management protocols will need to be observed to ensure potential contamination is avoided The storage of raw materials and products at the new installation presents the risk of contamination of surface or groundwater if accidental leaks occur in the machinery. However, the machines and associated pipe work will be properly designed and installed, and it is considered that the likelihood of any major leaks occurring is small.

The storage of by products such as the crushed CRTs and other e-waste can potentially cause contamination of ground and surface water. For this reason, the developers propose to store and conduct all operations within contained buildings with concrete floors to avoid leaching of harmful heavy metals to surface water and ground water.

6.3.3 Traffic and Road Safety Risks

The Project area is served by an adequate road network and the access road onto the Project premises is designed to smoothly handle any envisaged volume of traffic; therefore, additional impacts on general traffic congestion or road safety in the area as well as safety on the site are considered small or insignificant.

6.3.4 Occupational Health and Safety Risks

Potential sources of hazardous development in the operation of the E-Waste Plant will include:

- Dust: various potential sources of process and fugitive dust emissions were discussed above and excessive exposure to dust can, apart from being a nuisance, give rise to health problems. Of particular concern is particulate matter of 10 micrometres or less in diameter (PM_{10}) which is damaging to human health due to the ability of this matter to penetrate deep into the lung.
- Noise: this will arise from the operation of heavy machinery in various areas of the factory (e.g. machines) and prolonged exposure to high levels can result in hearing impairment.
- Operation of high voltage equipment

- Operation of mechanical moving equipment Fire/heat hazards (apply to every aspect of the factory and in particular electrical systems and handling of fuels)
- Lifting operations
- Maintenance / repair work (including high voltage electrical lines, equipment and devices)

Proper conditions of equipment and the correct work procedures are vital principles in reducing risks to a minimum and/or completely avoiding accidents.

6.3.5 Public Health and Safety Risks

General risks to public health resulting from the operation of the factory will include:

- The potential sources of contamination of water resources can have implications for public health especially if drinking water supplies are affected. However, given the isolated location of the factory and that the likelihood of contamination of water resources is low, the potential contamination of ground water and risk to public health is considered insignificant.
- Dust emitted from the Project site could potentially be a nuisance to workers on site and passers-by. Provided dust abatement measures are operated and maintained appropriately, potential risks to public health due to this factor are considered insignificant. Dust abatement measures include watering unpaved areas and reducing on the areas on the site that are unpaved.
- Transmission of HIV and communicable diseases: social interactions commonly associated with workplaces may lead to an increased risk of transmission of HIV and other communicable diseases.
- Other impacts on public health safety may include fire hazards from the buildings. The buildings will be fitted out with fire detection systems for early warning of a fire and firefighting systems such as fire hose reels and portable fire extinguishers to fight and contain any fire that may arise.

6.3.6 HIV/ AIDS Risks

Employment of unemployed people during the operation phase is likely to fuel risky sexual behaviour and prostitution resulting in the spread of HIV/AIDS and higher incidences of Sexually Transmitted Infections (STIs) in Makeni. During social activity the employees that may come from areas outside the Project areas of the Project may engage in sexual activity. The increase in sexual activity in the Project areas increases the risk of HIV/AIDS transmission as well as other STDs and STIs. Sexual behaviour and prostitution are likely to increase the number of unwanted pregnancies and orphaned children.

6.3.7 Soil Contamination

During operation, contamination due to accidental spillages of oil, greases, battery acid etc. from vehicles and other machinery may ruin the aesthetics of the area. Liquid waste may also be associated with the generation of foul odours from ablution blocks which can contaminate the soil and may even pose a health hazard. Pests, such as flies and rodents, may also be attracted to the area via the odour in order to scavenge on the solid or liquid waste. Leaching and spread of heavy metals from the Project can also cause soil contamination. Soil contamination adversely affect vegetation and make crops toxic for human consumption.

6.3.8 Exposure to Radioactive Radiation

Potential radioactive radiation includes contact with Americium, which is a radioactive substance found in electronic equipment used in the medical industry and fire detectors as the Project will also include management of hospital e-waste.

6.4 Evaluation of Potential Impacts

An appraisal of potential negative impacts that may result from the Project during the expansion and operational phases was given in the narratives in Sections 3.2 and 3.3 above. An attempt is made in this section to evaluate the overall significance of each identified impact by assigning values to a set of criteria as follows:

Table 10: Significance Ranking Matrix

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

Positive/Negative Mitigation Ratings

Table 11: Positive/Negative Mitigation Ratings

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

- **Type of Impact** (Direct / Indirect)
- **Duration** (Intermittent / Temporary / Short Term / Medium Term (Preparation and Installation Phase) / Long Term / Permanent)
- **Intensity / Severity** (Negligible / Low / Moderate / High)
- **Spatial Extent** (Site / Local (area surrounding the site) / Regional)
- **Likelihood** (Uncertain / Improbable / Probable / Highly Probable / Certain)
- **Sensitivity** [of the receptor; degree of change effected on natural processes or people's livelihoods] (Low / Moderate / High)
- **Overall Significance** (Insignificant / Low / Moderate / High)

The evaluation of impacts using these criteria is presented in Table 12 below:

Table 12: Evaluation of impact

Impact	Type of Impact	Duration	Intensity / Severity	Spatial Extent	Likelihood	Sensitivity	Overall Significance
PRE-INSTALLATION AND INSTALLATION PHASE							
Impacts on Air Quality and Noise Levels							
Dust releases due to exposed work sites	Direct	Intermittent-Medium term	Low	Site	Probable	Moderate	Low
Noise from machinery/traffic	Direct	Intermittent – Medium term	Low	Site	Probable	Low	Very Low
Impacts on Surface Water							
Disruption of surface drainage regime	Direct	Short term	Negligible	Site	Improbable	Low	Insignificant
Erosion and siltation of downstream drainage system	Direct	Temporary	Low	Local	Improbable	Moderate	Insignificant
Impacts on Ground Water							
Contamination of run-off and ground water from solid waste and garbage	Direct	Short term	Low	Site	Improbable	High	Low
Impacts on Ecosystem							
Loss of vegetation / Habitat	Direct	Permanent	High	Site	Probable	Moderate	Significant
Impacts on Labour and Social Well-being							
Child labour and forced labour risks	Indirect	Medium term	Moderate	Site	Improbable	High	Low-Moderate
Labour influx and strain on social facilities	Indirect	Medium term	Moderate	Local	Probable	High	Moderate
Exposure and transmission of diseases	Direct	Medium term	Moderate	Site/Local	Probable	High	Moderate-High
SEA/SH (Sexual Exploitation, Abuse, and Harassment)	Indirect	Medium term	Moderate	Local	Probable	High	Moderate-High
Impacts on Public Health and Safety							

Risk of accident involving members of the public	Direct	Short term	Low	Site	Improbable	High	Low
Impacts on Occupational Health and Safety							
Reduced occupational health and safety	Direct	Medium term	Low	Site	Probable	High	Moderate
OPERATIONAL PHASE							
Impact	**Type of Impact**	**Duration**	**Intensity / Severity**	**Spatial Extent**	**Likelihood**	**Sensitivity**	**Overall Significance**
Impacts on Air Quality							
Reduced air quality due to fugitive dust emissions	Direct	Intermittent - Long term	Moderate	Site	Probable	Moderate	Low-Moderate
Reduced air quality due to process dust emissions	Direct	Long term	Moderate	Site	Probable	Moderate	Moderate
Reduced air quality due to gaseous pollutants/emissions	Direct	Long term	Low	Site/Local	Probable	Moderate	Moderate
Impacts on Noise Levels							
Noise nuisance from process machinery	Direct	Intermittent - Long term	Moderate	Local	Probable	Moderate-Low	Low
Impacts on Water Quality							
Contamination of surface/ground water by hydrocarbons due to accidental leaks or spillages in bulk storage system	Direct	Long term	Low	Local	Improbable-Probable	High	Moderate-Low
Impacts on Occupational and Public Health and Safety							
Risk of dust nuisance to workers	Direct	Long term	Moderate	Site	Highly Probable	High	Moderate-High
Risk of fire	Direct	Long term	High	Site	Improbable-Probable	High	Moderate-High
Risk of waterborne diseases due to water contamination by various sources of pollution	Direct	Long term	Low	Local	Probable / Improbable	High	Low
Labour and Social Well-being Risks							

Risk of worker exploitation and unfair wages	Indirect	Long term	Moderate	Site	Probable	High	Moderate
Risk of SEA/SH	Indirect	Long term	Moderate	Site	Probable	High	Moderate-High

6.2 Environmental and Social Management Plan (ESMP)

Table 13: Environmental and Social Management Plan (ESMP)

ACTIVITY	ASPECT	ENVIRONMENTAL / SOCIAL IMPACT	MITIGATION MEASURES	RESPONSIBLE PERSONNEL	MONITORING / PERFORMANCE INDICATORS	FREQUENCY OF MONITORING	COST OF MONITORING AND MITIGATION
NEGATIVE ENVIRONMENTAL & SOCIAL IMPACTS							
PREPARATION & INSTALLATION PHASE: EXPANSION WORKS							
Demarcation of the warehouse into segments	Occupational health and safety	Noise pollution and Vibration	Conduct hazard risk assessment and develop safe systems of work CFK will ensure contractor provide proper training to the workers Ensure use of regularly serviced tools and vehicles Provision of PPE e.g., ear mufflers/plugs to workers	Site Agency	Noise levels within the statutory limit. Records indicating vehicle maintenance Absence of complaints Records of PPE issued to workers	Weekly	USD 1600
Movement and operation of heavy equipment and trucks Installation of machinery & equipment at the facility	Increased noise levels and vibration from site activities	Noise pollution and Vibration Reduced / Loss of hearing and sleep disturbance	CFK will ensure contractor provide workers with appropriate PPE and make usage of PPE mandatory where workers are exposed to elevated sound levels CFK will regularly monitor noise levels and ensure it does not exceed the maximum allowable limit stipulated by the WB EHS Guidelines Regularly maintain vehicles and equipment to ensure they are working as per manufacturer's specifications Monitor noise levels and ensure they do not exceed the maximum allowable 55 dB during daytime hours	Site Agent	Noise levels within the statutory limit. Records indicating vehicle maintenance. Absence of complaints Records of PPE issued to workers	Daily	

			and not more than 45 dB in the night in compliance with the WB EHS Guidelines on Noise level guidelines				
Site preparation	Stripping of topsoil and removal vegetation	Soil erosion & land disturbance	Limit site clearance to only the area for the placement of shipping containers Minimize soil compaction by avoiding the movement of heavy vehicles and machinery on wet soils and using wider tires where possible. Preserve topsoil by stockpiling and covering it. Reinstate topsoil after completion of construction works, where possible for landscaping.	Site Agent	Presence of covered stripped topsoil Percentage of site cleared vs. site restored.	Weekly	USD 1600
Transportation and offloading of materials to site	Reduced ambient air quality due to dust emissions	Air pollution	Provide dust masks to the workforce at points of high dust generation Regularly monitor air quality on the project site through the use of portable monitoring equipment Use low sulfur fuels in construction vehicles and equipment Sprinkle affected or worked areas with water to suppress fugitive dust Ensure construction materials are well covered to prevent littering and cause air pollution	Site Agent	Absence of dust Absence of complaints Number of trucks covered during transportation of vehicles	Daily	USD 2900
Installation of machinery & equipment at the facility Construction / Fabrication of sorting and dismantling tables	Unfair employment	Strain on social facilities due to increased migrant workers Child labour and forced labour Omission of vulnerable groups or persons	Prioritize hiring local community members to reduce, where possible, the number of migrant workers towards the project area of influence. Establish accessible worker GRM and periodically sensitize workers Adhere to minimum age when hiring, to avoid forced labour and child labour according to Employment Code Act	Site Agent	Presence of first aid kit Presence of worker GRM Records showing local people employed	Weekly	USD 1600
	Public health and safety	Psychological and physical harm	Periodically sensitize workers and community member.	Site Agent	Records of sensitization initiatives	Quarterly	USD 800

		GBV/SEA/SH	Establish accessible project GRM and periodically sensitize workers and community Sensitize workers and community on GBV/SEA/SH issues. Establish accessible worker GRM and periodically sensitize workers Introduce code of conduct for workers and signed by project workers.		Adherence to the GBV/SEA/SH policy Records of signed Code of Conduct		
Movement of delivery vehicles	Increased traffic	Reduced road safety	Road signs will be used to guide community members and construction workers on proper road use to reduce the risk of accidents A speed limit of 20 Km/hour will be set for vehicles moving within the project area. Ensure drivers are well trained on safe road practices Sensitize community member, especially children, on safe road practices during road use	Site Agent	Records of accidents Presence of safety signage Records of community sensitization conducted Number of trainings conducted with drives of construction vehicles	Daily	800
Movement of delivery vehicles Site preparation and clearing prior to installation of containers at Collection Centers	Oil leaks from delivery vehicles and hazardous chemicals	Surface and groundwater contamination	Develop and implement the CESMP Except for minor or emergency cases, carry out all repair and maintenance work offsite. Store and handle oil, lubricants, and other hazardous substances in accordance with the Environmental Management (licensing) regulations SI No, 112 of 2013 and the EHSGs of the World Bank. Use of non-leaking containers for storage of hazardous chemicals at the construction site The storage area for the hazardous materials will have an impervious floor with bunding.	Site Agent	CESMP developed and implemented Absence of material spills on the road Logbook of vehicles accessing the site Absence of oils on the ground Fuel stored in appropriate containers and on impervious surface Presence of spills	Daily	USD 1200

Movement of delivery vehicles Site preparation and clearing prior to installation of containers at Collection Centers	Oil leaks from vehicles and activities	Soil contamination	Train personnel dealing with oil products (e.g., mechanics, maintenance personnel) in handling and storage oil and hazardous chemicals. All vehicles will refuel at existing fuel stations in Livingstone. Store and handle oil, lubricants, and other hazardous substances in accordance with the Environmental Management (licensing) regulations SI No, 112 of 2013 and the EHSG of the World Bank.	Site Agent	Absence of oils on the ground Presence of dedicated hazardous materials and chemical storage area	Daily	
Welding works Installation of machinery & equipment at the facility Site branding at the e-waste facility and designated collection sites	OHS risks and poor waste management	Injuries & Accidents Exposure of workers to harmful metal fumes, ultraviolet radiation from the welding arc, burns from hot metal, electrical shock, eye injuries, and potential injuries from flying sparks, resulting in eye, nose and throat irritation, dizziness and nausea Inhalation of paint pigments by workers Soil and water contamination	Develop and implement the CESMP/HSMP Ensure to substitute hazardous paint with less hazardous Avoid using dishes, containers or utensils from the kitchen to mix and store paints and pigments. Read the material safety data sheet and label on the application and disposal of empty containers. Training workers in safe painting techniques Provide appropriate PPE for workers including gloves, safety goggles and respiratory equipment. Isolate welding activities using shields	Site Agent/ EHS Officer	CESMP/HSMP implemented Established systems of work & Risk assessment Form Records of training conducted, and PPE provided Records of less hazardous material used Presence of material safety data sheet labels, and safe application procedures Records of training conducted, and PPE provided. Records of waste disposal	Daily	USD 600
Construction related works including the following Installation of machinery &	Occupation health and safety	Injuries due to working in confined spaces, falls and trips in open and excavations	Conduct and implement a risk assessment using the risk assessment form Prepare safe working methods	Site Agent/ EHS officer	Site and task specific risk assessment forms Number of incidents on site	Daily	USD 2400

equipment at the facility			Ensure all works are inducted in health and safety including safe excavations including not working close to each other to avoid being hit by a pick Ensure are trained in working in confined spaces and with well outlined procedures Ensure all workers are supplied with appropriate and functional PPE (e.g., safety boots, safety glasses, hardhat, gloves, high visibility vest or work suit) before commencing any task as follows. Hard Hats: Protects the head from impacts and flying debris. Safety Glasses: Shields the eyes from dust, dirt, and small particles. Work Gloves: Provides a better grip on tools and protects hands from blisters and cuts. Steel-Toed Boots: Protects feet from heavy objects and sharp tools. High-Visibility Clothing: Ensures that workers are easily seen by others on the site. Implementing safe work practices to significantly reduce the risk of being hit by a pick during excavation Pre-Task Planning: Before beginning any excavation work, assess the site and identify potential hazards. Develop a plan that outlines safe work methods and assigns specific tasks to each worker. Establishing Safe Zones: Designate areas where tasks, such as digging or tool storage, should be carried out. Ensure that these zones are clearly marked and communicated to all workers.		Records of safe systems of work Training records including register of participants Records of PPE provided Good housekeeping on site		

			Maintaining a Safe Distance: Workers should maintain a safe distance from each other when using picks. A minimum distance of two meters is recommended to avoid accidental contact. Proper Handling and Storage: When not in use, picks should be stored securely in designated areas. Avoid leaving picks lying on the ground or in walkways where they can cause tripping hazards. Regular Equipment Inspections: Inspect picks and other tools regularly for signs of wear or damage. Replace any tools that are no longer safe to use. Communication Skills: Encouraging clear and concise communication among workers can prevent misunderstandings and ensure everyone is aware of ongoing activities.				
Construction related works including wall fencing	Community health and safety	Trips and falls in excavation trenches, exposure	Barricade work areas and excavation trenches Install appropriate signage to warn the public about the excavations Ensure to bury excavations within the shortest period.	Site Agent	Work site barricaded Installed signage Absence of open excavations Presence of spill kits on site Records of refueling at existing service stations Number of trainings held Training attendance registers	Daily	USD 1000
ACTIVITY	**ASPECT**	**ENVIRONMENTAL /SOCIAL IMPACT**	**MITIGATION MEASURES**	**RESPONSIBLE PERSONNEL**	**MONITORING / PERFORMANCE INDICATORS**	**FREQUENCY OF MONITORING**	**COST OF MONITORING AND MITIGATION**
OPERATIONAL PHASE							
NEGATIVE ENVIRONMENTAL & SOCIAL IMPACTS							

Sorting, dismantling and processing of e-waste equipment	Solid waste generation Generation of unrecovered e-waste	Contamination of groundwater and surface water	CFK will conduct sorting and dismantling operations strictly within the warehouse facility on impermeable surfaces CFK will provide appropriate PPE to project workers Ensure dismantling and sorting processes are dry processes Use designated bins for different waste types. Engage licensed waste collectors Promote recycling and reuse waste materials where possible Containment and Storage: Impermeable Flooring: Use impermeable surfaces for areas where e-waste is stored or processed to prevent leachate from seeping into the ground. Secondary Containment: Install secondary containment systems, such as bunds or dikes, around storage areas to capture any accidental spills or leaks. Ensure that sorting and dismantling operations are pure dry operations to prevent or avoid the possibility of any liquid percolating through e-waste materials. Surface Water Management: Conduct all activities away from surface water, ensure e-waste handling. Sorting or dismantling operations are dry processes to prevent contamination of nearby water bodies. Groundwater Protection: Conduct regular water sample collection and tests to check for contamination and take corrective actions if needed. Liners and Barriers: Where necessary use	Manager/EHS Officer	Quantity of waste segregated Number of training records on e-waste management procedures Impermeable floors in storage and dismantling areas Presence of monitoring wells and results. Soil monitoring results to assess heavy metal contamination of the vicinity	Weekly	USD 2500

			geomembrane liners and barriers beneath storage and processing areas to prevent contaminants from reaching the groundwater. Operational Controls: Proper Handling Procedures: Train employees on proper handling and processing techniques to minimize the risk of spills and leaks. Regular Inspections and Maintenance: Conduct regular inspections and maintenance of equipment and containment systems to ensure they are functioning correctly. Pollution Prevention: Waste Segregation: Separate hazardous and non-hazardous e-waste to reduce the risk of hazardous substances contaminating water sources. Recycling and Reuse: Maximize recycling and reuse of materials to minimize the amount of waste that needs to be stored or processed Emergency Response Planning Spill Response Plan: Develop and implement a spill response plan that includes procedures for containing and cleaning up spills quickly and effectively Emergency Equipment: Equip the facility with necessary spill response equipment, such as absorbents, booms, and neutralizing agents. Community Engagement and Compliance: Stakeholder Engagement: Engage with local communities and stakeholders to inform them about the measures in place and address any concerns. Regulatory Compliance: Ensure compliance with all relevant environmental regulations and standards to prevent legal and environmental issues.				

			Raise awareness among the local community about the importance of proper e-waste disposal and its impact on water quality and sanitation Educational campaigns and outreach programs can empower individuals to adopt responsible e-waste management practices, ultimately contributing to the preservation of water resources and the maintenance of a clean and healthy environment				
Sorting, dismantling and processing of e-waste equipment	Labour and OHS risks	Injuries associated with work activities	Develop and implement safe systems of work Develop and implement labour and OHS management plan in line with OHS Act, employment code Act, Factories Act, WB ESS2 and EHSGs Ensure the labour and OHS plan remains relevant and effective in managing labour-related risks during the operational phase. Implement OHS monitoring and improvements: Maintain ongoing OHS monitoring and risk assessments to identify and address emerging hazards or issues related to working conditions. Implement corrective and preventive measures to enhance OHS performance and maintain a safe working environment, in accordance with ZEMA regulations and the World Bank EHS General guidelines on section 2.0 – Occupational Health and Safety Promote worker engagement and feedback: Encourage worker participation and feedback in decision-making processes related to labour practices and working conditions. Foster open and transparent dialogue between management and workers to address concerns and continually improve workplace conditions.	Manager/EHS Officer	Safe systems of work in place Records OHS plan implementation Number of training records in safe systems of work on e-waste management Number of complaints recorded Number of injuries recorded	Weekly	USD 2000

			Maintain a grievance redress mechanism (GRM): Continue to operate and promote accessible grievance redress mechanisms for workers to report any concerns or violations during the operation phase. Promptly investigate and resolve grievances and implement corrective actions as necessary. Conduct periodic audits and assessments: Engage independent third-party auditors or the occupational health and safety department under the Ministry of Labour and Social Services to conduct periodic assessments of labour practices and working conditions during the operational phase. Use findings from these assessments to identify areas for improvement and implement corrective actions.				
E-waste sorting and dismantling operations	Possible heavy metal contamination	Land contamination	Ensure dismantling processes are dry processes and are done on impermeable surfaces Restrict entry to the warehouse Only trained personnel to handle sorting and dismantling operations Manage and store hazardous substances in accordance with the Environmental Management (licensing) regulations SI No. 112 of 2013 and the EHSG of the World Bank.	Facility / Operations Manager EHS Officer	Training records on proper e-waste management No. of contaminated site clean-up works done Records on bioremediation	Weekly	USD 3500
E-waste dismantling, shredding and handling operations	Reduced ambient air quality due to dismantling operations	Air pollution	Regularly monitor air quality on the project site by portable monitoring equipment like dust collectors Use dust collectors to collect dust particles Provide workers with suitable PPE Proper ventilation and air filtration systems: Effective ventilation systems equipped with high-efficiency particulate air (HEPA) filters should be installed at holding facilities to capture and remove airborne	Facility / Operations Manager EHS Officer	Absence of sick notes Dust levels within the statutory limits No. of complaints Presence of air abatement system	Daily	USD 1500

			particulates, heavy metals, and other pollutants generated during e-waste handling and dismantling processes. Emission control equipment: The use of emission control equipment, such as scrubbers, cyclones, or baghouse filters, is essential to remove pollutants from exhaust streams before their release into the atmosphere. Enclosed processing areas: Conducting e-waste dismantling and shredding operations within enclosed areas or structures is advisable to contain and control the release of dust, particulates, and other airborne contaminants. Dust suppression techniques: Implementing dust suppression measures, including water spraying or misting systems, can effectively minimize the generation and dispersion of dust during the handling and processing of e-waste. Proper waste storage: E-waste materials should be stored in covered containers or designated areas to prevent the release of pollutants into the air due to external disturbances such as wind. Restriction on open burning: The open burning of e-waste materials, which can release toxic fumes and persistent organic pollutants into the air, must be strictly prohibited. Comply with regulations by adhering to relevant air quality regulations, emission standards, and permitting requirements established by local, national, WB EHSG or international authorities is critical.		Works conducted in enclosures Quantity of e-waste covered Records of compliance to regulatory requirements		
Operation of machines and equipment	Worker injuries and health risks	Occupational health and safety	Use of only trained workers to operate the machinery Conduct and implement a risk assessment using the risk assessment form in Table 20	Facility Manger/EHS Officer	Training and certification of staff Machine maintenance and safety checks	Quarterly	USD 800

			Conduct regular safety training and drills Install emergency showers and eye wash stations Install proper signage and barricade hazardous areas Ensure machinery is fixed with emergency stop buttons All rotating parts and sharp edges to have safeguards Machine operating instructions to be visibly displayed		Emergency stop buttons installed on all machinery Machinery operating procedures displayed Safeguards installed on all rotating parts and sharp edges of the machine		
Use of electronic scrap shredder and baling machine	Risks of equipment related injuries Noise and vibrations	Mechanical hazards	Install safety guards and emergency stop buttons on machines. Conduct regular maintenance and inspections. Train workers on safe operation procedures. Provide first aid facilities and trained personnel Noise barriers and enclosures: Installing soundproof barriers or enclosures around noisy equipment, such as shredders, granulators, or compactors, can help contain and reduce the propagation of noise. Acoustic insulation: Applying acoustic insulation materials to walls, ceilings, and floors of the facility can help absorb and dampen noise levels within the premises. Strategic equipment placement: Strategically placing noisy equipment away from sensitive areas, such as offices or residential areas, and positioning them in dedicated noise-controlled zones can minimize the impact of noise on workers and nearby communities. For example, the centre is in a light industrial area, where citizens are used to light noises.	Facility / Operations Manager EHS Officer Facility / Operations Manager EHS Officer	Presence of a first aid kit Presence of a trained first aider Presence of safety signage Number of decibels recorded Presence of acoustic insulation on equipment Facility location in light industry area Procured lower noise level equipment Maintenance and lubricating schedule and records Noise monitoring plan Records of PPE provided	Weekly	USD 500

			Noise-reducing equipment: Investing in equipment and machinery that are designed to operate with lower noise levels or incorporating noise-reducing technologies, such as sound-dampening enclosures or vibration isolators. Maintenance and lubrication: Regular maintenance and proper lubrication of machinery and equipment can help reduce excessive noise levels caused by friction, wear, and tear. Scheduling of noisy activities: Scheduling noisy operations, such as shredding or compacting, during times when the impact on nearby communities is minimized, such as during daytime hours or avoiding weekends and holidays. Personal protective equipment (PPE): Providing workers with appropriate PPE, such as earplugs or mufflers, to protect them from excessive noise exposure within the facility. Noise monitoring: Implementing a noise monitoring program to regularly measure noise levels within the facility and at the facility boundaries, allowing for the identification of noise hotspots and the implementation of targeted mitigation measures. Buffer zones: Establishing buffer zones or green belts around the facility by planting trees or constructing earth berms, which can help absorb and attenuate noise propagation to nearby areas. Community engagement: Maintaining open communication with nearby communities,				
Storage of e-waste materials like batteries	Increased risk of fire	Fire hazard	Train workers in SOP in place	Facility / Operations Manager	Segregation of e-waste Presence of fire safety	Weekly	USD 650

			Install fire detection and suppression systems (fire extinguishers) Store flammable materials away from ignition sources. Conduct regular fire drills and training Maintain clear and accessible emergency exits.	EHS Officer	signage Records of fire drills & training conducted Presence of fire management systems		
Delivery of e-waste to site Truck loading activities	Increased traffic Soil degradation	Reduced road safety Compacted soil, soil erosion and sedimentation	E-waste deliveries to be planned for off peak hours A speed limit of 20 Km/hour will be set for vehicles moving in highly densely populated areas Ensure drivers are well trained on safe road practices Installation of signage at the facility to warn motorists and the public of delivery vehicles turning Truck Unloading Area Design: designate specific areas for truck unloading. These areas should be designed with impermeable surfaces, drainage systems, and sediment control measures to prevent soil compaction and erosion in surrounding areas. Vehicle Movement Restrictions: Implement traffic management plans to restrict vehicle movement to designated paved or compacted areas, thereby minimizing soil compaction in sensitive regions. Vegetative Cover: Maintain a vegetative cover, such as grasses or ground covers, on exposed soil areas within the facility's premises to stabilize the soil and prevent erosion caused by wind or water runoff. Stabilized Construction Entrances: Construct stabilized entrances and exits at the facility using materials like gravel or stone to prevent soil from being tracked onto adjacent roads by vehicles, thereby reducing the potential for erosion and sediment transport.	Facility / Operations Manager EHS Officer	Records of accidents Presence of safety signage Number of trainings conducted with drivers Installed signage at the facility Presence of designed unloading and loading areas Implementation of the traffic management plan Records of implementation of soil erosion management measures	Weekly	USD 800

Recruitment of project workers	Unfair employment	Influx of workers exploiting vulnerable persons	Implement the Labor Management Plan (LMP) to ensure fair employment opportunity in line with Zambian labour laws and with WB ESS2 Establish accessible worker GRM and periodically sensitize workers and ensure minimum age for employment in preventing forced labour and child labour	Facility / Operations Manager	Number of complaints Worker GRM established and records of implementation	Weekly	USD 550
Recruitment of project workers	Public health and safety	Psychological and physical harm GBV/SEA/SH	Periodically sensitize members of staff and community member. Establish accessible and dedicated GRM and periodically sensitize community Sensitize workers and community on GBV/SEA/SH issues. Establish accessible worker GRM and periodically sensitize workers Introduce code of conduct for workers and signed by project workers.	Facility / operations Manager EHS Officer	Records of sensitization initiatives Adherence to the GBV/SEA/SH policy	Quarterly	USD 550
Collection and transportation of e-waste	Risks of spillage in transit	Waste littering Reduced road safety	Use of trained and licensed truck drivers Use of appropriate collection vehicles e.g., container trucks or vehicles with canopy Secure the consignment with appropriate packaging to avoid spillage in transit	EHS Officer	Absence of complaints Presence of spillage	Daily	USD 400

ACTIVITY	ASPECT	ENVIRONMENT AL /SOCIAL IMPACT	MITIGATION MEASURES	RESPONSIBLE PERSONNEL	MONITORING / PERFORMANCE INDICATORS	FREQUENCY OF MONITORING	COST OF MONITORING AND MITIGATION
DECOMMISSIONING AND DEMOBILIZATION PHASE							

Operation of equipment at decommissioning stage	Reduced / loss of hearing due to elevated noise levels	Noise pollution	Provision of suitable PPE for the workers and members of staff. Where workers are exposed to elevated sound levels, use of personal protective equipment such as earmuffs/plugs will be mandatory. Noise levels will be monitored to ensure that they do not exceed 55 dB (WB Environmental, Health, and Safety (EHS) Guidelines, Noise level guidelines) during daytime hours and not more than 45 dB in the night. Operation hours for the construction phase will be limited to daytime hours.	Site Agent	Records of PPE issued Noise levels below 55dB during daytime and not more than 45 dB in the night Presence of safety signage showing the required PPE	Weekly	USD 3000
Uninstallation of facility equipment	Risks of equipment related injuries	Mechanical hazards	Train workers on safe operation procedures. Provide first aid facilities and trained personnel	Site Agent	Absence of complaints Absence of accidents	Daily	USD 2000
	Risks of injuries due to uninstallation works	Mechanical hazards		Site Agent	Absence of complaints Absence of accidents	Daily	
	Public health and safety	Health and safety hazards	Strict entry to work sites & Install safety signage Limit work hours to daytime only	Site Agent	Absence of complaints Absence of accidents	Daily	USD 2400

6.4 Monitoring and Reporting

To ensure successful implementation of mitigation measures, a robust monitoring and reporting framework will be established. The monitoring process will track the following key parameters during the operational phase:

- Drinking Water Quality
- Solid Waste Management
- Air Quality and Noise Levels
- Public Health
- Fire Safety and Emergency Preparedness
- Site Security

6.4.1 Budget for Mitigation Measures & Financing Plan

The budget for environmental and social mitigation measures will cover key areas such as air pollution control, occupational safety, waste management, water contamination prevention, and fire safety systems. Below is an estimated breakdown of costs.

Table 14: Budget for Mitigation Measures

Mitigation Measure	Estimated Cost (USD)
Air Pollution Control (Basic Air Filters, Ventilation Improvements)	12,000
Occupational Health & Safety (Essential PPE, Basic Training)	8,000
Waste Management & Disposal (Recycling Optimization, Basic Hazardous Waste Handling)	10,000
Water & Soil Contamination Prevention (Spill Kits, Basic Containment)	6,000
Fire Safety Systems (Basic Fire Extinguishers, Fire Drills)	5,000
Community Engagement & Training (Awareness Campaigns, Stakeholder Meetings)	5,000
Environmental Monitoring & Compliance (Periodic Inspections, Basic Reporting)	4,000
TOTAL BUDGET	**50,000**

6.3.2 Financing Plan

To fund these mitigation measures, CFK will generate finances through the following sources:

1. **Global Environment Facility (GEF) / World Bank Support**: The project is receiving funding under the Environmental Health and Pollution Management Programme (EHPMP**)**, which includes provisions for environmental safeguards.
2. Government Grants & Incentives: CFK will apply for financial support from ZEMA, the **Ministry** of Green Economy, and the Ministry of Commerce and Trade to align with Zambia's environmental sustainability initiatives.
3. Private Sector Partnerships: The company plans to engage technology firms, electronics manufacturers, and recyclers for joint funding and investment in sustainable e-waste management solutions.
4. Revenue from E-Waste Recycling: Through the sale of recovered materials (such as copper, gold, and rare earth metals extracted from e-waste), CFK will reinvest profits into mitigation efforts.
5. Corporate Social Responsibility (CSR) Programs – Large corporations, particularly those in ICT and electronics manufacturing, may provide funding as part of their CSR commitments to responsible e-waste management.
6. International Donors & NGOs: CFK will seek funding from environmental and sustainability-focused organizations, such as the United Nations Environment Programme (UNEP) and international recycling initiatives.

6.4 Emergency Response Plan (ERP)

The Emergency Response Plan (ERP) is essential for managing unexpected events or incidents in a timely and organized manner to minimize harm to people, the environment, and assets during all project phases (installation, operation, and decommissioning). The plan outlines actions to be taken in emergencies, including environmental, health, safety, and operational incidents, and ensures preparedness for both minor and major incidents.

6.4.1 Objective of the Emergency Response Plan (ERP)

The purpose of the ERP is to:

- Provide clear instructions to all personnel on appropriate actions during emergencies.
- Ensure quick and coordinated responses to minimize injury, environmental harm, property damage, and service disruption.
- Protect workers, contractors, visitors, the nearby community, and the environment.
- Ensure compliance with national and World Bank EHS guidelines.

6.4.2 Emergency Response Organization and Team

An Emergency Response Team (ERT) will be designated, available 24/7 during preparation, operation, and decommissioning phases. All ERT members will be trained in first aid, fire safety, environmental protection, evacuation procedures, and specific project hazards.

Key Emergency Response Personnel:

Role	Responsibility	Assigned Personnel
Incident Commander	Overall authority during emergencies	Site Agent / Manager
Safety Officer	Occupational Health & Safety oversight	Appointed Safety Officer
Fire Safety Officer	Fire safety and suppression coordination	Trained Fire Warden
Environmental Officer	Environmental incident response	Environmental Manager
Medical Officer	Medical care and first aid coordination	Onsite First-Aider or Nurse

Emergency Contact Numbers:

- Local Fire Department 993
  - Lusaka Central Fire Station: +260 211 220 180
- Ambulance Service 992 or 902, 995, 905
  - Lusaka Ambulance Service: +260 211 220 180
- Police Department 991
  - Lusaka Central Police Station: +260 211 220 006
- Site Manager +260 977 401 091
- Environmental Manager +260 950 003 128
- Project Manager +260 977 200 722
- Nearest Hospital Contact 992 or 902, 995, 905
  - Kanyama First Level Hospital: +260977164626 / +260 970 258 132

Emergency numbers and a simple emergency flowchart will be posted at strategic areas throughout the site.

6.4.3 Emergency Response Procedures

Each type of emergency has specific response procedures:

A. Fire or Explosion Emergency

Immediate Actions:

- Sound alarm and evacuate personnel to designated assembly points.
- Use nearest fire extinguishers for small fires only if trained and safe.
- Call local fire services.
- Shut down machinery/equipment if safe to do so.

Post-Emergency Actions:

- Conduct headcount at the assembly point.
- Investigate the cause and document findings.
- Implement corrective actions to prevent reoccurrence.

B. Hazardous Material Spill

Immediate Actions:

- Alert nearby personnel and evacuate.
- Don appropriate PPE (gloves, goggles, boots) before any action.
- Deploy spill containment kits (absorbent pads, booms).
- Inform the Environmental Manager and initiate external clean-up if necessary.

Post-Emergency Actions:

- Complete a spill incident report.
- Decontaminate affected areas appropriately.
- Review containment and prevention protocols.

C. Medical Emergency / Worker Injury

Immediate Actions:

- Contact first-aid trained personnel immediately.
- Administer first aid on-site.
- Evacuate to the nearest health facility if needed.
- Notify emergency medical services for serious injuries.

Post-Emergency Actions:

- Record the incident thoroughly.
- Investigate causes and implement preventive measures.

D. Electrical or Mechanical Failure

Immediate Actions:

- Shut off affected equipment immediately.
- Evacuate if there is a risk of fire or electrocution.
- Call electrical or mechanical engineers to assess.

6.4.4 Engineering and Administrative Controls

- **Automatic alarms** and **fire suppression systems** installed where necessary.
- **Accessible emergency equipment** (fire extinguishers, spill kits, first aid kits) throughout the facility.
- **Emergency notifications** to community stakeholders via SMS alerts, public address systems, and radio messages.
- **Emergency drills** conducted every six months.
- **Designated Emergency Response Plan (ERP) Coordinator** at each site.
- **Evacuation Maps** visibly posted across all sections of the facility.

6.4.5 Incident Reporting and Investigation Steps

A. Immediate Actions After an Incident:

- Ensure personnel safety and secure the incident site.
- Provide first aid if needed.

- Contain environmental incidents quickly.

B. Reporting the Incident:

- Report immediately to the Supervisor or Incident Commander.
- Fill in Incident Report Form (date, time, location, description, corrective action).

C. Investigation:

- Begin within 24 hours.
- Identify causes, contributing factors, and propose preventive measures.
- Engage Health and Safety Committee for recommendations.

D. Reporting to Authorities:

- Report serious incidents (e.g., spills, hospitalizations) to ZEMA, Ministry of Labor, and local authorities within required timeframes.

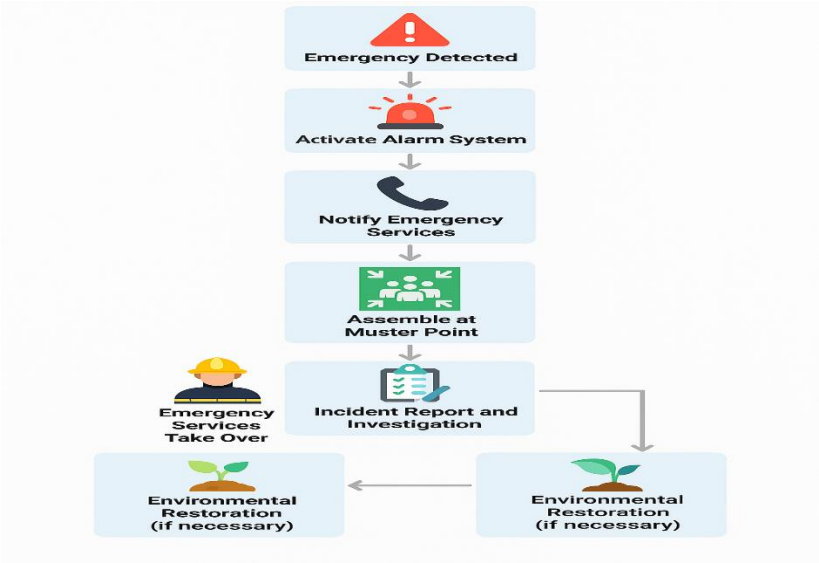
E. Documentation and Records:

- Maintain an Incident Report Log.
- Regular analysis of incident trends for preventive actions.

6.4.6 Emergency Preparedness Training

- Mandatory training sessions for all staff on ERP procedures.
- Specialized training for ERT members on fire suppression, spill response, and first aid.
- Simulation drills at least twice annually to test readiness.
- Evaluation and revision of ERP after each drill.

6.4.7 Emergency Response Flowchart



6.4.8 Estimated Budget for ERP Implementation

Activity	Estimated Cost (USD)	Notes
PPE procurement (fire suits, first aid kits, spill kits)	$1,000	Initial setup and annual replacement
Emergency drills and training	$1,500	Two drills and four trainings per year
Emergency communication systems (alarms, signage)	$2,000	Installation and maintenance
Environmental Clean-up equipment	$1,350	Absorbent materials, waste drums
Emergency Response Plan Coordinator costs	$1,500	Annual

Total Estimated ERP Budget: $7,350

6.5 Occupational Health and Safety (OHS) Management Plan

The Occupational Health and Safety (OHS) Management Plan aims to prevent injuries, illnesses, and fatalities during all phases of the project by implementing systematic safety measures, compliance controls, and continuous improvements. It applies to all employees, contractors, visitors, and any third-party service providers involved in project activities.

6.5.1 OHS Objectives

The primary objectives of the OHS Management Plan are:

- Prevent work-related injuries, illnesses, and fatalities.
- Comply with applicable Zambian OHS regulations, international labor standards, and best industry practices.
- Foster a strong culture of health, safety, and environmental awareness.
- Ensure that all workers receive adequate health and safety training and are equipped with appropriate Personal Protective Equipment (PPE).
- Promote proactive identification and management of workplace hazards and risks.
- Establish a system for continuous monitoring, reporting, and improvement of OHS performance.

6.5.2 OHS Key Responsibilities

Position	Responsibilities
Site Agent / Project Manager	Overall responsibility for implementing and overseeing the OHS Management Plan across all project activities.
Safety Officer	- Manage daily safety operations- Conduct inspections and safety audits- Enforce the use of PPE- Provide OHS training and awareness sessions- Maintain the incident reporting system.
All Workers	- Adhere to all site-specific safety guidelines- Properly use PPE and safety equipment- Report unsafe acts or conditions immediately.
Emergency Response Team (ERT)	Act as first responders during emergencies and ensure rapid communication and response to incidents.
Contractors and Visitors	Must comply with site safety rules and participate in safety inductions before accessing the site.

6.5.3 OHS Risk Assessment and Control

The project will conduct continuous risk assessments to identify and control workplace hazards.

Hazard Identification:

- Machinery and equipment risks
- Manual handling and ergonomic risks
- Noise, dust, and airborne contaminants
- Exposure to hazardous substances (e.g., batteries, e-waste residues)
- Fire hazards
- Electrical hazards
- Slip, trip, and fall hazards

Risk Control Measures:

- Engineering Controls: Machine guarding, ventilation systems, noise dampening.
- Administrative Controls: Safe work procedures, shift rotations to reduce fatigue.
- PPE Requirements: Safety boots, gloves, hard hats, eye protection, respirators, and hearing protection as required.
- Emergency Preparedness: Installation of fire extinguishers, spill kits, and clearly marked evacuation routes.
- Restricted Access: High-risk areas demarcated and access limited to authorized personnel only.

Emergency Drills:

- Regular evacuation, fire response, spill control, and medical emergency drills.

First Aid Measures:

- Maintain accessible, fully stocked first aid kits at key locations.
- Ensure trained First-Aiders are present across operational areas.

6.5.4 OHS Training and Awareness

Training is essential to achieving and maintaining a safe working environment.

Type of Training	Details
Induction Training	Mandatory for all new employees and visitors before site access; covering basic safety rules, hazard awareness, and emergency procedures.
Refresher Training	Conducted at least annually or when there are significant procedural changes.
Specialized Training	Topics include: • PPE usage and maintenance • Hazardous material handling • Manual handling techniques • Electrical safety • First aid and injury prevention • Fire-fighting and emergency evacuation.
Toolbox Talks	Weekly safety discussions led by the Safety Officer to reinforce awareness and address site-specific issues.

Training attendance will be documented, and certificates issued where applicable.

6.5.5 OHS Monitoring and Auditing

To maintain effective OHS controls, monitoring and auditing activities will include:

Routine Inspections:

- Daily inspections by the Safety Officer to promptly identify hazards.

Monthly Audits:

- Formal site-wide OHS audits, including hazard control measures, PPE compliance, and housekeeping standards.

Incident Reviews:

- Any accident, near miss, or unsafe condition will trigger a formal review and corrective action process.

Health Surveillance:

- Periodic health checks for employees exposed to potential risks (e.g., noise, hazardous materials) as required.

Records Management:

- Maintain detailed records of inspections, incidents, audits, training, and health surveillance.

6.5.6 OHS Performance Review and Continuous Improvement

Quarterly Reviews:

- The Safety Officer will prepare quarterly OHS performance reports analysing incidents, audit results, and general compliance.

Corrective Actions:

- Recommendations for improvements will be implemented based on incident trends and audit findings.

Worker Feedback:

- Workers will be encouraged to suggest safety improvements through open feedback sessions and suggestion boxes.

Annual OHS Management Review:

- Senior Management will conduct an annual review of the OHS program to assess its effectiveness, resource allocation, and continuous improvement needs.

7.0 ESMP IMPLEMENTATION BUDGET

The successful implementation of the Environmental and Social Management Plan (ESMP) requires adequate financial resources to ensure that mitigation measures, monitoring activities, training programs, stakeholder engagement, and occupational health and safety (OHS) practices are properly executed throughout the project's operational life cycle.

The table below summarizes the estimated budget required for the full implementation of the ESMP:

Category	Activity / Item	Estimated Cost (USD)	Remarks
Environmental Mitigation Measures	Air Pollution Control (Basic Air Filters, Ventilation Improvements)	12,000	Based on mitigation requirements
	Waste Management & Disposal (Recycling Optimization, Basic Hazardous Waste Handling)	10,000	E-waste handling, recycling activities
	Water & Soil Contamination Prevention (Spill Kits, Basic Containment)	6,000	Prevention of environmental degradation
	Fire Safety Systems (Basic Fire Extinguishers, Fire Drills)	5,000	Essential fire protection measures
Occupational Health & Safety (OHS)	PPE Procurement (Safety Helmets, Gloves, Eye Protection, Respirators, etc.)	5,000	Minimum PPE for worker safety
	OHS Training (Induction, Emergency Drills, Refresher Courses)	3,000	Ensuring continuous health and safety training
Environmental Monitoring & Compliance	Periodic Environmental Inspections & Compliance Audits	3,000	Routine inspections and audits
	Environmental Monitoring Equipment (Air Quality Meter, Spill Detection Tools)	4,000	Monitoring and reporting compliance
Training and Capacity Building	Staff Training on EHS Management Systems, Emergency Response, and Reporting	2,500	Enhancing internal EHS capacity
Stakeholder Engagement	Community Awareness Campaigns (e-waste health and safety awareness)	3,000	Public sensitization activities
	Stakeholder Meetings & Consultation Forums	2,000	Regular stakeholder communication
Supervision & Administration	Safety Officer (part-time EHS supervision)	4,500	Spread across project phases
	Environmental Officer (part-time environmental compliance monitoring)	4,000	Spread across project phases
Contingency (10%)	For unexpected EHS activities and emergency responses	7,500	To cover unforeseen costs

| **TOTAL ESTIMATED BUDGET** | | **71,500 USD** | |

7.1 Budget Justification

- **Environmental Mitigation Measures** ensure minimal environmental degradation and pollution risks.
- **Occupational Health & Safety** activities safeguard worker health and prevent accidents.
- **Environmental Monitoring** is critical to ensure ongoing regulatory compliance.
- **Training and Capacity Building** strengthen the internal ability to manage risks.
- **Stakeholder Engagement** is essential for community acceptance and project sustainability.
- **Supervision and Administration** ensure oversight, enforcement, and continuous improvement of ESMP actions.
- **Contingency** funds provide a safety buffer for unexpected requirements.

8.0 SUMMARY

According to the assessment:

- Social and economic benefits are expected to result from the Project which will include the provision of a number of new employment opportunities during both the expansion and operational phases of the Project, the generation of public revenue in terms of rates and taxes and contributing towards meeting a growing shortfall of quality products in Lusaka province.
- Safe working practices and adherence to safety regulations will be given high priority during both expansion and operational phases of the Project.
- The Project will be committed to strict waste management protocols during expansion and operational phases including the management of solid waste and sewage in accordance with applicable regulations and requirements.
- The type of Project is compatible with the general trend and rate of development in the Project area.
- The implementation of the Project will contribute towards ensuring sustainable disposal of electronic waste.
- All steps to minimise emissions to air and prevent contamination by electronic materials and products to ground will be incorporated in the design, expansion and operation of the Plant

9.0 CONCLUSION: PAVING THE WAY FOR A SUSTAINABLE FUTURE

The development and implementation of this Environmental and Social Management Plan (ESMP) represent a significant milestone in addressing Zambia's e-waste management challenges. Under the auspices of the Environmental Health Pollution Management Program (EHPMP), Crescent Future Kids (CFK) is committed to building a state-of-the-art recycling facility that adheres to international environmental standards while promoting community health and sustainable development.

This ESMP is not just a technical document - it is a call to action. It highlights CFK's dedication to responsible environmental stewardship, community engagement, and compliance with the EHPMP's objectives. By aligning with this program, CFK ensures that its operations reflect global best practices while addressing local needs.

The success of this initiative depends on the collaboration of all stakeholders, government agencies, industry leaders, local communities, and funding partners. Together, we can transform the environmental and social challenges of e-waste into opportunities for growth, innovation, and sustainability.

By adhering to this ESMP, CFK reaffirms its commitment to shaping a cleaner, healthier, and more sustainable future for Zambia and beyond. The steps we take today will lay the foundation for generations to come.

Signed:

Management of Crescent Future Kids (CFK)

Authenticity

This report has been prepared in accordance with guidelines set out by Zambian Laws and ZEMA statutory instruments as well as the WB Environmental and Social Framework.

To the best of our knowledge the contents of the document are factual and are authentic as provided by sources consulted.

Signed:

Crescent Future Kids Limited

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Appendix I: Security Personnel Management Plan

	CRESCENT FUTURE KIDS LIMITED	**Updated**
		07-03-2025
	SECURITY PERSONNEL MANAGEMENT PLAN	**Revision No.**
		01
		Doc No.
		003

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1.0 Introduction

This plan outlines the security protocols and personnel management strategies designed to protect the facility, its assets, and personnel from potential security threats. It is integrated into the overall Environmental and Social Management Plan (ESMP) to ensure a holistic approach to risk management. The ESMP for the proposed E-waste facility will take a proactive and adaptive approach to managing security risks. The project will work closely with local law enforcement agencies, community representatives, and security experts to refine and implement the plan. Regular training and capacity-building initiatives will be provided for security personnel to maintain high standards of preparedness and response.

2.0 Scope:

The plan applies to all areas of the facility, including storage, processing zones, administrative offices, and external perimeters. It is designed to be flexible, evolving with periodic risk assessments and emerging threats.

3.0 Risk Assessment

Site-Specific Threat Analysis:

- Hazard Identification: Evaluate potential threats, including unauthorized access, vandalism, theft, sabotage, and environmental hazards.
- Vulnerability Assessment: Determine vulnerabilities related to facility layout, access control points, and critical infrastructure.
- Risk Prioritization: Rank identified risks based on likelihood and potential impact, guiding resource allocation and response planning.

Periodic Review:

Regular assessments (at least bi-annually) to ensure the plan remains relevant with evolving threats and operational changes.

Security Personnel Roles and Responsibilities

Security Management Team:

- Security Manager: Oversees the entire security plan, conducts risk assessments, and liaises with external agencies.

- Shift Supervisors: Manage day-to-day security operations, ensure adherence to protocols, and coordinate emergency responses.
- Security Personnel: Trained to monitor the premises, conduct patrols, and implement access control procedures.

Duties and Responsibilities:

- Access Control: Manage entry and exit points with badge systems, visitor logs, and screening procedures.
- Surveillance: Monitor CCTV feeds and alarm systems; maintain a secure central monitoring room.
- Incident Response: Implement rapid response procedures for breaches, unauthorized access, or emergencies, including escalation protocols.
- Documentation and Reporting: Maintain detailed logs of security incidents, patrols, and system checks for continuous improvement.

4.0 Recruitment, Training, and Compliance

Recruitment and Selection:

- Prioritize the hiring of qualified security personnel with relevant experience and local knowledge.
- Ensure background checks and verification of credentials are completed prior to appointment.

Training Programs:

- Initial Training: Comprehensive on boarding covering the facility layout, security protocols, emergency procedures, and the use of security equipment.
- Ongoing Training: Regular refresher courses, scenario-based drills, and updates on evolving security threats and technology.
- Compliance Training: Ensure all personnel understand legal, regulatory, and contractual obligations.

Code of Conduct:

- Establish a code of conduct that outlines behavioural expectations, ethical guidelines, and conflict resolution mechanisms for security personnel.

5.0 Operational Procedures

Access Control and Monitoring:

- Visitor Management: Implement a sign-in process, issue temporary access badges, and escort non-regular visitors.
- Perimeter Security: Use fencing, motion sensors, and CCTV surveillance to monitor and secure the facility boundaries.
- Internal Security: Conduct random patrols and routine checks to deter internal breaches or unauthorized movements.

Emergency and Incident Response:

- Incident Command System (ICS): Establish an ICS for managing security incidents with clearly defined roles and a communication tree.
- Emergency Drills: Schedule regular drills to test response times and coordination with local law enforcement and emergency services.
- Crisis Communication: Develop a communication plan to notify staff, stakeholders, and external agencies promptly during an incident.

Use of Technology:

- Surveillance Systems: Maintain high-resolution CCTV cameras with recording capabilities and real-time monitoring.
- Alarm Systems: Integrate motion detectors, intrusion alarms, and access control systems to trigger immediate alerts.
- Data Management: Secure storage and regular review of security data to identify patterns and improve future responses.

6.0 Coordination with External Agencies

Local Law Enforcement and Emergency Services:
Establish communication channels with local police, fire departments, and emergency medical services.
Coordinate periodic joint exercises to ensure seamless integration during emergencies.

Community and Stakeholder Engagement:

- Develop protocols for information sharing with local community leaders and stakeholders.
- Conduct community awareness programs to foster cooperation and vigilance

7.0 Monitoring, Reporting, and Continuous Improvement

Performance Monitoring:
Use key performance indicators (KPIs) such as incident response times, frequency of breaches, and system downtime to evaluate security performance.
Implement regular audits and reviews of security practices.

Reporting Mechanisms:

- Maintain detailed logs of all security-related activities.
- Ensure prompt documentation and review of incidents with follow-up actions to prevent recurrence.

Plan Review and Update:

- Schedule regular reviews of the security plan (at least annually) to incorporate lessons learned, technological advances, and changes in the operational environment.
- Update the plan based on new risk assessments and stakeholder feedback.

8.0 Conclusion

he Security Personnel Management Plan is designed to provide a robust, adaptive, and comprehensive framework for safeguarding the facility. By integrating detailed risk assessments, clearly defined roles and responsibilities, and continuous monitoring and training, the plan ensures the security of the facility, its personnel, and the surrounding community.

Appendix II: OHS Management System

	CRESCENT FUTURE KIDS LIMITED	**Updated**
		07-03-2025
	OHS MANAGEMENT SYSTEM	**Revision No.**
		01
	TRAINING OF CONTRACTORS PLAN (TCP)	**Doc No.**
		003

1.0 Introduction

This plan outlines the framework for providing targeted training to contractors and their workers engaged in the project. The training is designed to ensure full understanding and compliance with the Code of Conduct, Environmental & Social (E&S) provisions outlined in the ESMP and the contractor's ESMP, with particular focus on critical areas such as Gender-Based Violence (GBV), Occupational Health and Safety (OHS), and Emergency Preparedness and Response.

2.0 Scope:

This plan applies to all contractors engaged in the project and covers initial induction training, periodic refresher sessions, and targeted modules addressing specific E&S requirements.

3.0 Training Objectives

- Enhance Compliance: Ensure that all contractors understand and comply with the Code of Conduct and the E&S provisions outlined in both the project's ESMP and contractor ESMP.
- Promote Safety: Equip workers with essential knowledge on occupational health and safety standards and practices.
- Address Social Concerns: Educate workers on preventing and addressing gender-based violence and discrimination.

- Build Emergency Preparedness: Prepare contractors to effectively prevent, respond to, and manage emergency situations.
- Foster Continuous Improvement: Encourage ongoing learning and adaptation of best practices throughout the project lifecycle.

4.0 Training Modules

Code of Conduct and E&S Provisions

- Overview**:**
  - Introduction to the project's ESMP and contractor ESMP.
  - Key elements of the Code of Conduct.
- Focus Areas:
  - Ethical behaviour, transparency, and accountability.
  - Roles and responsibilities of workers in ensuring compliance.
- Delivery:
  - Interactive workshops and presentations.
  - Case studies and role-playing exercises.

Gender-Based Violence (GBV) Awareness

- Overview:
  - Understanding GBV and its impact on the workplace and community.
- Focus Areas:
  - Identifying, preventing, and addressing GBV incidents.
  - Reporting mechanisms and support systems.
- Delivery:
  - Expert-led training sessions.
  - Distribution of informational materials and resources.

5.0 Occupational Health and Safety (OHS)

- Overview:
  - Fundamental safety protocols and procedures.
- Focus Areas:
  - Personal protective equipment (PPE) usage.
  - Safe work practices, hazard identification, and risk mitigation.

- Procedures for reporting and managing workplace incidents.

- Delivery:
  - Practical demonstrations and on-site training.
  - Safety drills and interactive safety exercises.

6.0 Emergency Prevention, Preparedness, and Response

- Overview:
  - Strategies for emergency prevention and planning.
- Focus Areas:

- Emergency response procedures and the role of each contractor in an emergency.
  - Communication protocols during emergency situations.
  - Regular emergency drills and simulation exercises.
- Delivery:
  - Classroom sessions combined with practical drills.
- Coordination with local emergency services for realistic training scenarios.

Implementation Strategy

Pre-Engagement Training
Initial Induction:

- All contractors will undergo mandatory induction training prior to the commencement of work.
- Training will be documented and attendance recorded.

Ongoing and Refresher Training

- Periodic Sessions:
  - Regular refresher courses will be conducted to update contractors on any changes to E&S provisions and reinforce best practices.
  - Additional sessions will be scheduled based on risk assessments or in response to emerging issues.

Custom Training Sessions

- Site-Specific Modules:
  - Tailored training for specific site operations or identified risks.

- Collaborative sessions with subject matter experts to address unique challenges at different project stages.
- Monitoring and Evaluation

7.0 Training Records and Documentation

- Maintain comprehensive records of all training sessions, attendance, and feedback for audit and improvement purposes.

8.0 Performance Assessments

Pre- and Post-Training Assessments:

- Evaluate knowledge gained through pre- and post-training assessments.

Periodic Reviews:

- Monitor contractor performance and compliance through regular audits and on-site evaluations.
  - Feedback Mechanisms:
- Collect feedback from contractors and workers to continuously refine training content and delivery.

9.0 Continuous Improvement

- Use evaluation data and lessons learned to update training modules and adjust the plan as necessary, ensuring that it remains effective and relevant throughout the project lifecycle.

10.0 Roles and Responsibilities

- Project Control Unit (PCU):
  - Oversee the planning, coordination, and implementation of all training activities.
  - Ensure that all contractors are fully briefed and compliant with the training requirements.
- Contractor Management Team:
  - Facilitate on-site training sessions and ensure contractor participation.
  - Provide ongoing support and monitor adherence to E&S and safety standards.
- External Training Providers/Experts:
  - Deliver specialized training sessions (e.g., GBV, OHS) as required.
  - Collaborate with the PCU to ensure training content is accurate and up to date.

11. Conclusion

The Training of Contractors Plan is a critical component in ensuring that all project workers are equipped with the knowledge and skills necessary to adhere to the highest standards of environmental, social, and occupational performance. By providing comprehensive, ongoing, and targeted training, the project aims to promote a culture of compliance, safety, and ethical behaviour that supports both project success and community well-being.

Appendix II - Labour Management Plan

	CRESCENT FUTURE KIDS LIMITED	**Updated**
		07-03-2025
	MANAGEMENT SYSTEM	**Revision No.**
		01
	LABOUR MANAGEMENT PLAN (LMP)	**Doc No.**
		001

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1.0 Introduction

The LMP establishes a framework for the effective management of labour resources throughout the project lifecycle. It aims to ensure compliance with local and international labour standards, foster positive employee relations, and promote socio-economic benefits for the surrounding community. The contractor's ESMP will explicitly incorporate detailed labour-related clauses that govern workplace health, safety, and environmental protocols. These clauses will align with national labour laws and international best practices, ensuring that all operational activities are conducted in a safe and compliant manner. A tailored Code of Conduct will be established, forming a critical component of the LMP. This code will: Set clear expectations for ethical behaviour and professional interactions among all employees. Define protocols for grievance redressal, ensuring that any concerns are managed transparently and swiftly. Outline responsibilities and disciplinary measures to maintain a respectful and inclusive work environment. Recognizing the importance of community engagement and local capacity building, the ESMP will include specific language that prioritizes the hiring of local unskilled labour. This strategic initiative aims to; enhance employment opportunities for local residents. Facilitate skills development through on-the-job training and capacity- building programs. Support socio-economic growth in the surrounding community by aligning workforce development with local labour market needs. Ensure that recruitment practices are fair, transparent, and compliant with affirmative action principles where applicable.

Scope:

This plan applies to all personnel involved in the project—from direct employees and contractors to subcontractors—covering recruitment, training, working conditions, and dispute resolution.

Policy Framework and Guiding Principles

Labour Rights and Standards:

- Adherence to national labour laws, international labour standards, and relevant industry best practices.
- Ensuring non-discrimination, equal opportunity, and fair treatment for all employees.

Community and Local Labour Prioritization:

- Prioritizing the hiring of local unskilled labour to support community development and socio-economic growth.
- Promoting local capacity building through targeted training and upskilling programs.

Ethical and Transparent Practices:

- Upholding ethical recruitment and employment practices.
- Maintaining transparent communication channels between management, employees, and community stakeholders.

2.0 Recruitment and on boarding

Recruitment Strategy:

- Local Hiring Initiatives: Actively engage with local community job centres and relevant stakeholders to prioritize local candidates.

- Fair Selection Process: Implement a structured and transparent recruitment process that includes background checks, interviews, and skills assessments to ensure the best candidate selection.

On boarding Process:

- Orientation Programs: Introduce new hires to the project's mission, safety protocols, and operational guidelines.
- Mentorship and Support: Pair new employees with experienced staff for guidance during the initial on boarding period.

3.0 Training and Capacity Building

Initial and Ongoing Training:

- Basic Skills Training: Provide essential training for unskilled labour, covering areas such as safety, operational procedures, and the proper handling of equipment.
- Technical and Professional Development: Offer ongoing training modules for skill enhancement, career progression, and compliance with operational standards.

Health and Safety:

- Safety Protocols: Regular safety training sessions and drills to ensure employees understand emergency procedures and workplace safety guidelines.
- Wellness Programs**:** Initiate programs that promote physical and mental well- being among the workforce.

4.0 Employee Rights, Code of Conduct, and Workplace Culture Code of Conduct:

- Standards of Behaviour: Establish a clear code of conduct outlining expectations regarding behaviour, ethical practices, and professional conduct.
- Disciplinary Procedures: Define a transparent process for addressing breaches of conduct, including corrective actions and appeals.

Grievance Redressal Mechanism:

- Open Channels: Develop multiple channels (e.g., in-person meetings, anonymous reporting systems) for employees to raise concerns or report issues without fear of reprisal.
- Timely Resolution: Ensure grievances are addressed promptly and fairly, with clear documentation and follow-up actions.

5.0 Working Conditions and Employee Welfare Fair Compensation and Benefits:

- Competitive Wages: Ensure wages and benefits are competitive and commensurate with the local market and job requirements.
- Inclusive Benefits: Provide benefits that support employee health, safety, and welfare, including medical insurance, leave entitlements, and social security contributions.

Work Environment:

- Safe and Healthy Workplaces: Maintain an environment that meets or exceeds safety and health regulations, with regular audits and risk assessments.
- Inclusive Practices: Foster a diverse and inclusive workplace where every employee feels valued and respected.

6.0 Grievance Redress Mechanism (GRM)

1. Introduction

The Grievance Redress Mechanism (GRM) is designed to enable the effective resolution of grievances raised by project stakeholders, including employees, local communities, and other affected parties during the implementation of the e-waste recovery facility project. The objective of the GRM is to provide a fair, transparent, and accessible process to address grievances and ensure that all affected parties' concerns are properly addressed.

2. Key Principles of the GRM

- **Transparency**: The grievance process should be transparent, ensuring that all stakeholders understand the process and are able to access information on how grievances will be handled.
- **Confidentiality**: Complainants' identities and details will be kept confidential, especially in cases related to Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH).
- **Accessibility**: The GRM should be accessible to all stakeholders, including vulnerable groups. Multiple communication channels (e.g., hotline, email, physical submission) should be provided.
- **Responsiveness**: Grievances should be addressed in a timely and effective manner, with appropriate resolutions provided at each stage.
- **Accountability**: The GRM process will include a mechanism for tracking and reporting on the resolution of grievances.

3. GRM Process Overview

The GRM will consist of the following stages:
Stage 1: Grievance Submission
Who Can Submit a Grievance:

- Employees
- Community members (including local residents and stakeholders affected by the project)
- Contractors, suppliers, and subcontractors
- Any other affected parties

How to Submit a Grievance:

- **Written Grievance**: Stakeholders can submit a grievance in writing (physical letters, emails).
- **Verbal Grievance**: Complaints can be reported verbally via a grievance hotline or during face-to-face meetings.
- **Anonymous Grievance**: Stakeholders can also submit grievances anonymously if they prefer to remain confidential.

Submission Channels:

- **Email**: grievances@cfk.org
- **Hotline**: +260 977 401 091 (available 24/7)
- **Physical Submission**: Grievances can be dropped at the CFK office or community grievance boxes located at key project areas.
- **Community Meetings**: Grievances can be raised during regular stakeholder engagement or consultation meetings.

Stage 2: Acknowledgement and Logging of Grievance

- **Acknowledgement**: The grievance will be acknowledged within **3 working days** from the submission date. If the grievance is submitted verbally, the complainant will receive a confirmation of receipt either verbally or in writing.
- **Logging**: Each grievance will be logged in the **Grievance Tracking System** with details of the complainant, nature of the grievance, date received and contact information (if not anonymous).

Stage 3: Grievance Review and Investigation

- **Initial Review**: The project's **GRM Officer** will review the grievance to ensure it falls under the scope of the GRM. If the grievance is deemed out of scope, the complainant will be informed and referred to the appropriate body.
- **Investigation**: For grievances related to labor, environmental, social impacts, or violations (e.g., GBV, SEA/SH), a dedicated investigation team will assess the facts of the complaint. The investigation should be completed within **10 working days**.
- **Confidentiality**: The investigation process will ensure confidentiality, particularly for sensitive issues like SEA/SH or GBV, with the identity of the complainant protected throughout the process.

Stage 4: Grievance Resolution

- **Resolution**: Based on the findings of the investigation, a resolution will be proposed and communicated to the complainant within **15 working days** from the completion of the investigation.
  - **Accepted Grievances**: If the grievance is valid, appropriate corrective or preventative action will be taken.
  - **Non-Accepted Grievances**: If the grievance is found to be unfounded or outside the scope of CFK's project, the complainant will be notified of the reason and referred to alternative channels (e.g., judicial authorities, external arbitration).
- **Timely Action**: Grievance resolution should be executed within a reasonable timeframe, considering the nature and complexity of the issue.

Stage 5: Monitoring and Follow-Up

- **Follow-Up**: After the resolution, CFK will follow up with the complainant to ensure that the solution has been implemented and that no further issues arise.

- **Monitoring**: The GRM Officer will ensure continuous monitoring of resolved grievances to evaluate their effectiveness and impact.

Stage 6: Appeals

- If the complainant is dissatisfied with the resolution or feels that the process was handled improperly, they have the right to appeal the decision.
  - **Appeal Process**: The appeal should be submitted in writing to the **Project Manager**, who will conduct a further review and provide a final decision within **15 working days**.
  - **External Grievance Redress**: If the complainant is not satisfied with the final decision, they may escalate the matter to external bodies such as the **World Bank's Grievance Redress Service** or use the **country's judicial system**.

Gender-Based Violence (GBV) and Sexual Exploitation and Abuse (SEA) Safeguards

- **Anonymity & Confidentiality**: Complainants related to GBV, SEA, or SH can report issues anonymously through the grievance channels. All information will be handled with the utmost confidentiality.
- **Support Services**: CFK will ensure that complainants of GBV or SEA/SH are informed of and referred to relevant support services, including counseling, medical care, and legal assistance.
- **Special Grievance Redress Mechanism**: In cases of GBV, SEA, or SH, an **Emergency Response Protocol** will be initiated, which includes immediate action, police involvement, and referral to specialized agencies.

Stakeholder Engagement and Training

- **Stakeholder Engagement**: CFK will continuously engage with stakeholders to raise awareness about the GRM process and encourage participation. Regular meetings and consultations will provide platforms for grievances to be raised.
- **Training**: CFK will ensure that project staff, contractors, and security personnel are trained on the grievance process, including handling sensitive cases like GBV and SEA/SH.
- **Labor and Code of Conduct Training**: All project employees, contractors, and suppliers will receive training on the **Code of Conduct**, labor rights, and health & safety practices, including specific provisions related to GBV, SEA/SH, and ethical conduct.

GRM Monitoring and Reporting

- **Monitoring**: The GRM will be monitored regularly to assess its effectiveness, efficiency, and fairness. The **GRM Officer** will prepare monthly reports on the number and nature of grievances received and resolved.
- **Reporting to Stakeholders**: CFK will report on the GRM outcomes as part of its **Environmental and Social Compliance** reports to key stakeholders, including the community, regulatory bodies, and funding partners.

7. Contact Information

- **Grievance Officer**: Joseph Kamtondole
- **Email**: grievances@cfk.org
- **Hotline**: +260 977 401 091 (Available 24/7)
- **Physical Address**: Plot 687/7, Los Angeles Road, Makeni, Lusaka
- **Emergency Support (GBV/SEA/SH)**: Toll Free - **116 Childline** and **933 GBV**

8. Monitoring, Reporting, and Compliance

Performance and Compliance Monitoring:

- Regular Audits: Conduct periodic internal and external audits to ensure adherence to the LMP.
- Key Performance Indicators (KPIs): Establish KPIs related to recruitment efficiency, training outcomes, safety records, and grievance resolution effectiveness.

Reporting Mechanisms:

- Documentation: Maintain detailed records of recruitment, training, employee performance, and grievance resolution.
- Continuous Improvement: Use data and feedback to continuously improve labour management practices and update the LMP as needed.

9. Stakeholder Engagement and Communication

Internal Communication:

- Regular Meetings: Hold regular staff meetings and training sessions to keep employees informed of policy changes, performance metrics, and new opportunities.
- Feedback Loops: Encourage feedback through surveys, suggestion boxes, and direct dialogue with management.

External Collaboration:

- Community Engagement: Work with local community leaders, labour unions, and government agencies to align project operations with local socio- economic priorities.
- Transparency: Share key aspects of the LMP and project updates with stakeholders to build trust and collaboration.

10.Implementation and Review

Implementation Strategy:

- Phased Roll-Out: Introduce the LMP in phases, beginning with recruitment and on boarding, followed by ongoing training and monitoring.
- Responsibility Matrix: Clearly define roles and responsibilities for managers, HR personnel, and supervisors in the implementation of the plan.

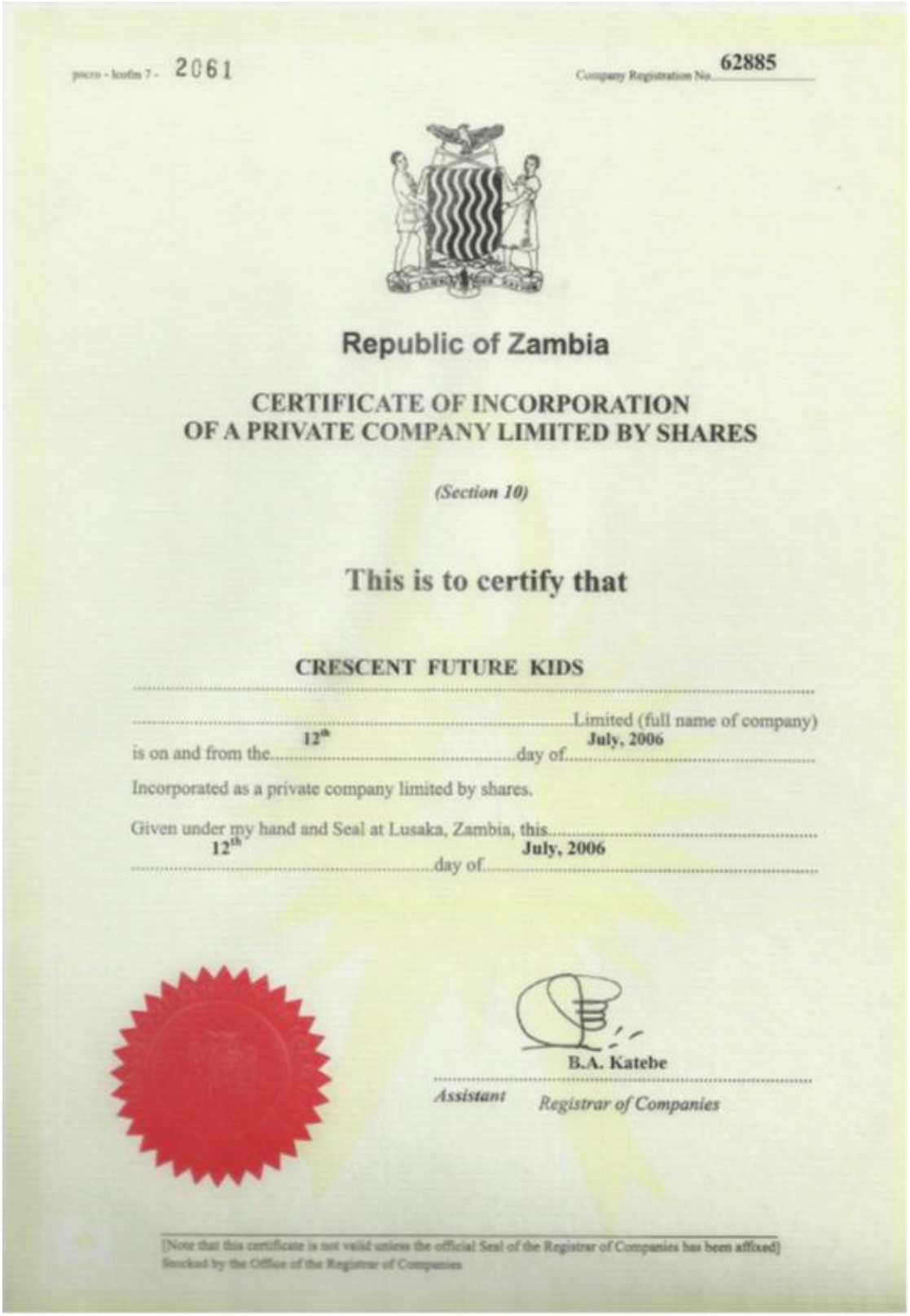
Review and Update:

- Periodic Reviews: Conduct comprehensive reviews of the LMP at least annually or in response to significant operational changes.
- Stakeholder Input: Incorporate feedback from employees and community stakeholders to refine and enhance the plan.

11.Conclusion

This Labour Management Plan is designed to support the successful and ethical implementation of the project while ensuring that the local community benefits from employment opportunities and capacity building. By upholding rigorous labour standards, fostering an inclusive work environment, and continuously monitoring and improving practices, the project demonstrates its commitment to sustainable and responsible labour management.

Appendix III - Certificate of Incorporation



pacro - knfm 7 - 2061

Company Registration No. 62885

Republic of Zambia

CERTIFICATE OF INCORPORATION
OF A PRIVATE COMPANY LIMITED BY SHARES

(Section 10)

This is to certify that

CRESCENT FUTURE KIDS

.....Limited (full name of company)

is on and from the 12th day of July, 2006

Incorporated as a private company limited by shares.

Given under my hand and Seal at Lusaka, Zambia, this 12th day of July, 2006

B.A. Katebe

Assistant Registrar of Companies

[Note that this certificate is not valid unless the official Seal of the Registrar of Companies has been affixed]
Stocked by the Office of the Registrar of Companies

Appendix IV - Tax Clearance Certificate

ZAMBIA REVENUE AUTHORITY | My Tax Your Tax Our Destiny

General Tax Clearance Certificate

TPIN: 1002235468 **Jurisdiction:** ISMTO_Lusaka

Taxpayer Name: CRESCENT FUTURE KIDS LIMITED
Physical Address: MAKENI PELIKANI ROAD MAKENI Lusaka

Province: LUSAKA PROVINCE **Date:** 21/03/2025
Email: ASINKOLONGO@GMAIL.COM **Certificate Number:** 2547283246
Contact Number: 0977891647

Dear Sir/Madam

RE: TAX CLEARANCE CERTIFICATE FOR CRESCENT FUTURE KIDS LIMITED - SECTION 81B (CAP

This is to certify that CRESCENT FUTURE KIDS LIMITED trading as CRESCENT FUTURE KIDS LIMITED with TPIN 1002235468 is duly registered for tax purposes.

In addition, this tax clearance certificate has been issued to CRESCENT FUTURE KIDS LIMITED trading as CRESCENT FUTURE KIDS LIMITED pursuant to section 81 B of the Income Tax Act (CAP 323).

This certificate is valid up to 31/12/2025.

Accordingly, in terms of section 81 B of the Income Tax Act, for the duration of this certificate, the above named is free to conduct business in line with the trading license held.

Please note that any established act of non-compliance with the provisions of the Income Tax Act shall invalidate this Certificate.

You are advised to always scan the QR code to verify the validity of this Tax Clearance Certificate especially when submitted on a date different from the print date.

Yours Faithfully,

JOSEPH NONDE

Zambia Revenue Authority

NOTE: This notice has been issued for and on behalf of the Commissioner General

Zambia Revenue Authority Domestic Taxes Division
Enquiries Email: advice@zra.org.zm Website: www.zra.org.zm
ZRA National Call Center: 4111

Appendix V – ZEMA Decision Letter

ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

Head Office
Corner of Church & Suez Roads
P.O Box 35131
Lusaka, Zambia
Tel: +260-211-254023/254059

All Correspondence to be addressed to
The Director General
info@zema.org.zm www.zema.org.zm

In reply please quote

No:
ZEMA/EIA/ EPB/9147

March 2, 2021

The Director
Crescent Future Kids Limited
Plot 687/7 Los Angeles Road
P.O Box 380182
LUSAKA

Dear Sir/Madam,

RE: DECISION LETTER IN RESPECT OF THE ENVIRONMENTAL PROJECT BRIEF FOR THE PROPOSED CONSTRUCTION OF AN E-WASTE MANAGEMENT PLANT ON FARM NO. 687/7 LOS ANGELES ROAD, MAKENI ROAD, LUSAKA BY CRESCENT FUTURE KIDS LIMITED.

Reference is made to the above captioned Environmental Project Brief ("EPB") submitted to the Zambia Environmental Management Agency ("ZEMA") on **October 23, 2020** for consideration in accordance with the requirements of the Environmental Management Act No. 12 of 2011 as read together with the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations Statutory Instrument No.28 of 1997.

ZEMA has since reviewed the EPB and based on the information provided by yourselves and taking into account written and verbal comments from interested and affected parties as well as our site verification inspection findings; the said EPB has been **approved** with conditions.

You are advised to fully acquaint yourselves with the conditions herein and to ensure compliance thereof.

Yours faithfully,

John Msimuko
Director General
ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

Cc. The Director General-Zambia Information and Communications Technology Authority, **LUSAKA**
The Town Clerk – Lusaka City Council, **LUSAKA**
The Executive Director – National Council for Construction, **LUSAKA**
The Executive Director – Zambia Bureau of Standards, **LUSAKA**
The Executive Director – Zambia Meterology Agency, **LUSAKA**
The Director Legal Services- ZEMA, **LUSAKA**

1

Northern Regional Office
P.O Box 71302
Tel: +260-212-621048/610407

Solwezi
P.O Box 110134
Tel: +260-218-821297

Livingstone
P.O Box 60195
Tel: +260-213-321279

Chipata
P.O Box 510527
Tel: +260-216-221254

Chirundu
P.O Box CRU 31 Chirundu
Tel: +260-211-515261

Appendix VI – ZEMA E-Waste License

Republic of Zambia

Zambia Environmental Management Agency

Environmental Management Act, No. 12 of 2011

SERIAL NO.: **000422**

LICENCE NO.: **LSK/HWL/04180/Z04/2021**

HAZARDOUS WASTE MANAGEMENT LICENCE

Holder's Name: **CRESCENT FUTURE KIDS LIMITED**

Address: **PLOT NO. 687/7, LOS ANGELES ROAD, MAKENI, LUSAKA.**

This Licence relates to the **Transportation, Pre-treatment, Storage** and **Exportation** of Hazardous Waste.

The Licence is granted for a period of **3 Years** commencing on the **19th** day of **October, 2021** to **18th** day of **October, 2024.**

The conditions of grant of the Licence are as shown in the Annexure attached hereto.

Issued at **Lusaka** this **19th** day of **October, 2021**

.....

Director-General

ENDORSEMENT OF LICENCE

This Hazardous Waste Licence has this **19th** day of **October, 2021** been entered in the Register.

Official Stamp

Director General

Appendix VII - Land Documents (Title DEED)

DR 1A

REPUBLIC OF ZAMBIA

No.: 3743

Registered No.: 687/A/1/D/44/22

THE LANDS AND DEEDS REGISTRY ACT

(Section 45)

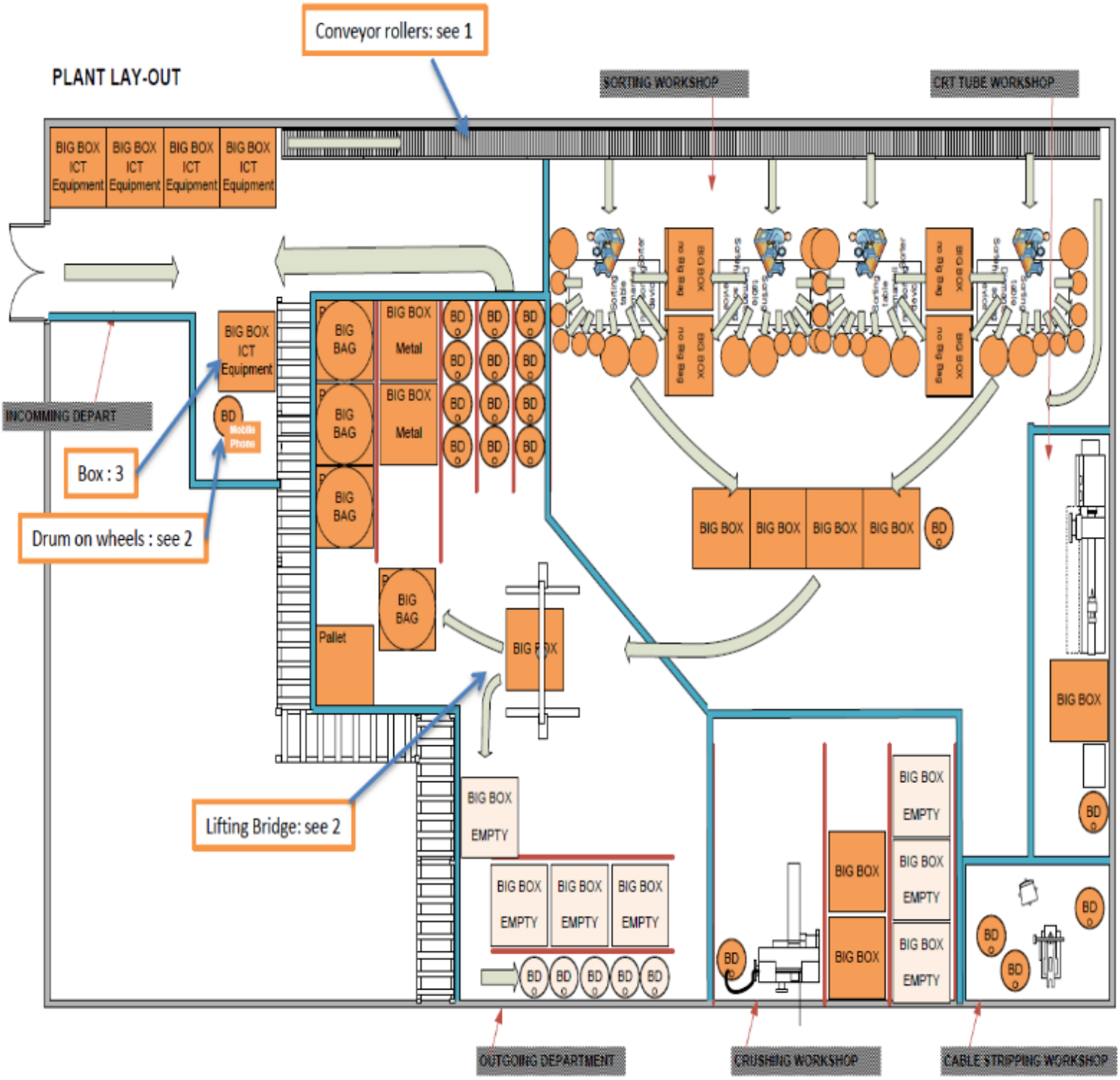
CERTIFICATE OF TITLE

THIS Certificate, dated the THIRTIETH day of OCTOBER two thousand and FOURTEEN under the hand and seal of the Registrar of the Lands and Deeds Registry of Zambia WITNESSETH that CRESCENT FUTURE KIDS LIMITED a Company incorporated in Zambia and having its registered office at Lusaka

is a tenant or lessee for the unexpired residue of a term of 99 years from the first day of April, 1980 (subject to such reservations, restrictions, incumbrances, liens, estates and interests as are notified by memorial underwritten or endorsed hereon) of and in ALL that piece of land in extent 9.3935 hectares more or less being Subdivision No.44 of Subdivision D of Subdivision No.1 of A of Farm No.687 situate in the Lusaka Province of Zambia which piece of land is more particularly delineated and described on Diagram No.2089 of 1956 except and reserved all minerals oils and precious stones whatsoever upon or under the said land

Registrar

Appendix VIII - Site Plan:



Appendix IX – Water Examination Laboratory Results

SCHOOL OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT
ENVIRONMENTAL ENGINEERING LABORATORY
P.O Box 32379, Lusaka

PHYSICAL/CHEMICAL EXAMINATION OF WATER

REFERENCE : EEL2502040
Attn : Crescent future kids

Lusaka
Sampled by : Client
Sampling date : 11.02.2025
Report date : 12.02.2025

Laboratory Results

Parameter	Water Sample	WHO Guideline (Maximum permissible value for drinking water)
pH	7.44	6.5 – 8.5
Turbidity (NTU)	0.21	5
Conductivity (µs/cm)	1362	1500
Total Dissolved Solids (mg/l)	681	1000
Total Suspended Solids (mg/l)	<1.0	-
Total hardness (as mg $CaCO_3$/l)	376	500
Calcium hardness (as mg $CaCO_3$/l)	360	500
Alkalinity (as mg $CaCO_3$/l)	372	500
Iron (mg/l)	<0.0001	0.3
Ammonia (as NH_4-Nmg/l)	0.6035	1.5
Sulphates (mg/l)	87.869	250
Chlorides (mg/l)	165.0	250
Nitrates (as NO_3–N mg/l)	21.803	10.0
Nitrites (as NO_2–N mg/l)	0.0123	0.100
Acidity (as mg $CaCO_3$/l)	Nil	500
Total phosphates (mg/l)	<0.0001	5.0
Magnesium (mg/l)	3.84	-
Calcium (mg/l)	144.0	200
Fluorides (mg/l)	0.12	1.50
Potassium (mg/l)	35.94	-
Sodium (mg/l)	108.90	200
Manganese (mg/l)	<0.001	0.50
Bacteriological Results		
E.coli (#/100ml)	0	0
Total coliforms (#/100ml)	42	0
Feacal coliforms (#/100ml)	19	0

Tests carried out in conformity with " Standard Methods for the Examination of water and Wastewater APHA, 1998".

Comment: On the day of sampling the bacteriological quality of the water **was bad. the water needs to be treated before drinking (i.e. boiled, chlorinated, UV treated etc.)**

The physical and chemical tests were within ZABS standards for drinking water.

Tested by: D. Muwowo — Lab. Technician
Checked & Approved by: D. Mkandawire — Chief Engineer

SCHOOL OF ENGINEERING
12 FEB 2025
CIVIL AND ENVIRONMENTAL ENGINEERING LABORATORY
P.O BOX 32379, LUSAKA

Appendix X – Soil Analysis Laboratory Report

SCHOOL OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT
ENVIRONMENTAL ENGINEERING LABORATORY

P.O Box 32379, Lusaka

SOIL ANALYSIS

Attn : Crescent Future Kids Ltd
Lusaka
Sampled by : Client
Sampling date : 23.09.2025
Report date : 03.10.2025

Laboratory Results

Parameter	A	B	C	D
pH	7.51	7.74	7.65	7.58
Barium (ppm)	<0.01	<0.01	<0.01	<0.01
Lead (ppm)	<0.01	<0.01	<0.01	<0.01
Copper (ppm)	<0.003	<0.003	<0.003	<0.003
Cadmium (ppm)	<0.0002	<0.0002	<0.0002	<0.0002
Mercury (ppm)	<0.0002	<0.0002	<0.0002	<0.0002
Chromium (ppm)	<0.01	<0.01	<0.01	<0.01

Tests carried out in conformity with "Standard Methods for the Examination of water and Wastewater APHA, 1998".

Tested by: E. Mutati..... Checked & Approved by: O. Kalinda.....
Lab. Technician Ag Chief Engineer

UNIVERSITY OF ZAMBIA
SCHOOL OF ENGINEERING
03 OCT 2025
CIVIL AND ENVIRONMENTAL
ENGINEERING LABORATORY
P.O.BOX 32379, LUSAKA

Appendix XI – Partnership Letters

Recycle 河南瑞赛克环保设备有限公司
Henan Recycle Environmental Protection Equipment Co., Ltd.
Email: yorke@recycle999.com Tel: +86 17752563317 Web: http://www.sunyrecycle.com

[Date: 27th.July.2023]

[Contact:Alpha]
[Title:Director]
[Company name : Crescent Future Kids Limited]
[Company Address:Plot 687/7, Los Angeles Road, Lusaka 10101, Zambia]

Dear Alpha,

Partnership Proposal for Supply of Recycling Machinery

We are pleased to receive your request for a partnership proposal. As a leading manufacturer of recycling machinery, Our Henan Recycle has been dedicated to providing high-quality solutions to support sustainable development worldwide. We understand that you are pursuing a grant from the World Bank and the Zambia Environmental Management Agency (ZEMA) to support your project in the field of waste recycling and environmental management, and we would be honored to be considered as a key supplier for this important initiative.

This letter serves to confirm our commitment to entering into a partnership with Your Crescent Future Kids for the supply of our advanced recycling machinery. As part of this partnership, we are fully prepared to provide the necessary equipment to support your proposal and contribute to the success of your grant application.

Scope of Partnership:

- **Products & Services**: We will supply a comprehensive range of recycling machinery, including [shredder,crusher,separator,etc.], in accordance with your project's specifications and requirements.
- **Quality & Standards**: All machinery will adhere to international quality standards, ensuring reliability, efficiency, and long-term performance.
- **Support**: We offer technical support, training, and after-sales services to ensure the optimal operation of the equipment in your region.
- **Payment & Delivery**: As per our standard agreement, payment terms will be discussed and agreed upon once the grant is secured, and we will coordinate the delivery and installation of the machinery as per the project timeline.

We understand the importance of securing funding for this project, and we are ready to cooperate fully to help you achieve the success of your grant proposal. Attached, you will find the detailed quotations for the required machinery as requested.

Recycle 河南瑞赛克环保设备有限公司
Henan Recycle Environmental Protection Equipment Co., Ltd.
Email: yorke@recycle999.com Tel: +86 17752563317 Web: http://www.sunyrecycle.com

We look forward to a successful partnership and to contributing to the growth of sustainable recycling practices in Zambia. Should you need any further information or clarification, please do not hesitate to contact us.

Thank you for your trust in [HENAN RECYCLE]. We are excited about the opportunity to work with you on this significant project.

Sincerely,
Name: Yorke
Title: Business Manager
Company Name: Henan Recycle Environmental Protection Equipment Co., Ltd.
Phone: +8617752563317

SDDA Africa
Sustainable Digital Development Alliance for Africa

Nairobi on, 28 November, 2024

Contact Person: Seth Munyambu
Tel: +254 733 986 558
Email: seth.munyambu@sdda.africa

TO WHOM IT MAY CONCERN

This letter is to officially confirm that **Crescent Future Kids Limited, P.O. Box 380098 Plot 687/7, Los Angeles Road, Lusaka 10101, Zambia** is a registered and active member of the Sustainable Digital Development Alliance (SDDA).

As part of this Pan-African Alliance, **Crescent Future Kids Limited** plays a crucial role in advancing the SDDA's mission to scale access to technology for education, promote sustainable practices in the recycling and refurbishment of electronic devices, and reduce the harmful environmental impact of e-waste.

The SDDA is composed of a wide range of stakeholders, including refurbishers, recyclers, IT Asset Disposition (ITAD) specialists, businesses, non-governmental organizations (NGOs), and government agencies. Together, we work towards creating a circular economy for electronics and developing innovative solutions to responsibly manage and recycle end-of-life devices.

Crescent Future Kids Limited is an integral part of this collaborative effort, contributing significantly to the Alliance's work in promoting environmental sustainability and advancing digital inclusion across the African continent.

If you have any questions or require further verification regarding **Crescent Future Kids Limited**'s affiliation with the SDDA, please feel free to contact us at Phone: +260 977 200 722 Email: **inquiries@cfkz.org** Web: **www.cfkz.org**

Thank you for your attention to this matter.

Sincerely,

Mr. Seth Munyambu
Chief Executive Officer
SDDA Africa

P.O Box 48584 – 00100 | Embakasi Mihango, Nairobi - Kenya www.sdda.africa

AGREEMENT FOR PARTNERSHIP IN E-WASTE MANAGEMENT PROJECT

This Agreement is made and entered into on 4th May 2024 ("Effective Date")

BETWEEN:

Umicore Precious Metals Refining
Pamelstraat 22, 2250 Olen, Belgium
("Umicore")

AND

Crescent Future Kids Limited (CFK)
Plot 687/7, Los Angeles Road, Lusaka 10101, Zambia
("CFK")

WHEREAS, CFK is engaged in an Electronic Waste (E-Waste) Management Project; and

WHEREAS, Umicore has expertise and experience in precious metals refining and recycling; and

WHEREAS, the Parties wish to collaborate and partner in the E-Waste Management Project.

NOW, THEREFORE, in consideration of the mutual covenants and promises contained herein, the Parties agree as follows:

ARTICLE 1: PURPOSE AND SCOPE

1.1 The purpose of this Agreement is to outline the terms and conditions of the partnership between Umicore and CFK in the E-Waste Management Project.

1.2 The scope of this Agreement includes the provision of technical knowledge, training, skills, and expertise by Umicore to CFK, and the sale of E-Waste by CFK to Umicore.

ARTICLE 2: OBLIGATIONS OF UMICORE

2.1 Umicore shall provide technical knowledge, training, skills, and expertise to CFK to enhance its E-Waste management capabilities.

2.2 Umicore shall purchase E-Waste from CFK at mutually agreed prices.

ARTICLE 3: OBLIGATIONS OF CFK

3.1 CFK shall sell E-Waste to Umicore at mutually agreed prices.

3.2 CFK shall ensure that all E-Waste sold to Umicore is properly sorted, graded, and prepared for transportation.

ARTICLE 4: TERMS AND CONDITIONS

4.1 The term of this Agreement shall commence on the Effective Date and continue for a period of [LENGTH OF TIME].

Umicore Marketing Services U.K. Ltd
Collier House, Mead Lane
Hertford, Herts SG13 7AX
Tel: 01992 553939
Fax: 01992 585460
www.umicore.com
E-mail: ims.uk@umicore.com
VAT: GB 816 3127 48
Registered in England No. 4781785

4.2 This Agreement may be terminated by either Party upon [NUMBER] days' written notice to the other Party.

ARTICLE 5: CONFIDENTIALITY

5.1 The Parties agree to maintain the confidentiality of all information exchanged pursuant to this Agreement.

ARTICLE 6: INTELLECTUAL PROPERTY

6.1 All intellectual property rights in and to any technology, process, or know-how provided by Umicore to CFK shall remain the exclusive property of Umicore.

ARTICLE 7: GOVERNING LAW

7.1 This Agreement shall be governed by and construed in accordance with the laws of Belgium.

ARTICLE 8: DISPUTE RESOLUTION

8.1 Any disputes arising out of or in connection with this Agreement shall be resolved through arbitration in accordance with the Rules of Arbitration of the International Chamber of Commerce.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above written.

UMICORE PRECIOUS METALS REFINING

By: _____
Name: Mr. Matthias Schmidt
Title: Managing Director
Date: _____

CRESCENT FUTURE KIDS LIMITED (CFK)

By: _____
Name: EPHRAIM SIMUKONDE
Title: CHIEF EXECUTIVE OFFICE (CEO)
Date: 05 MAY 2024

Umicore Marketing Services U.K. Ltd
Collier House, Mead Lane
Hertford, Herts SG13 7AX
Tel: 01992 553939
Fax: 01992 585460
www.umicore.com
E-mail: ims.uk@umicore.com
VAT: GB 816 3127 48
Registered in England No. 4781785