

Dura Plast (SL) Limited

Draft Environmental, Social and Health Impact Assessment (ESHIA) Report

For

A Steel Manufacturing Plant

At Magbentha Village,

Koya Chieftdom, Port Loko District.



**Prepared by Centre for Environmental Research and Quality Management
(CERQM)**

January, 2022.

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ACRONYMS

CBD	Convention on Biodiversity
CBOs	Community Based Organisations
CDAP	Community Development Action Plan
CERQM	Centre of Environmental Research and Quality Management
CITES	Convention of the International Trade of Endangered Species
CO ₂	Carbon dioxide
CSOs	Civil Society Organisations
ESHIA	Environmental and Social Health Impact Assessment
EPA-SL	Environment Protection Agency Sierra Leone
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESMP	Environmental and Social Management Plan
FAO	Food Agricultural Organisation
I&APs	Interested and/or Affected Parties
IEE	Initial Environmental Examination
IFC	International Funding Cooperation
NGOs	Non-Governmental Organisations
NO ₂	Nitrogen dioxide
PHC	Population and Housing Census
pH	Potential for Hydrogen ions
PPP	Public Participation Process
SL	Sierra Leone
TDS	Total dissolved solids
UNDP	United Nations Development Projects
UNFCCC	The United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Dura Plast (SL) Limited proposed to build a steel mill at Magbentha Village in the Koya Chiefdom, Port Loko District, Sierra Leone's Northern Region. For this proposed quarry activity within the said location, an Environmental, Social, and Health Impact Assessment (ESHIA) statement/report has been prepared.

The no-steel-manufacturing alternative would keep the environment in its existing state, with continuous environmental deterioration caused by slash-and-burn agriculture, which contributes significantly to climate change.

The ESHIA's goal is to document current baseline conditions and provide a tool for proactive management of the proposed steel manufacturing project's environmental, social, and health impacts/risks.

A method of periodic environmental monitoring was used to measure these impact/risk indicators. For successful environmental management, potential impacts were identified and mitigation methods were established.

Based on baseline investigations, impact assessments, impact evaluations, and compliance with national and international standards, the ESHIA was created.

The Environmental and Social Management Plan (ESMP) for this project was developed based on the baseline studies completed and best practices for the projected project activities in the areas of:

- Environmental Policies and Principles
- Ambient Air Quality Management Plan
- Noise Pollution Control
- Water Quality and Water Resources Management Plan
- Over burden soil Management Plan
- Land Reclamation Management Plan
- Waste Management Plan
- Chemicals Management Plan
- General Occupational Safety and Health Management Plan

In addition, in consultation with the affected communities, a Community Development Action Plan (CDAP) worth two hundred million Leones (Le200,000,000.00) was developed for the affected community for a two-year period with reference to the fulfillment of the requirement for the acquisition of an EIA Licence. The CDAP must be renewed at the conclusion of the designated time to cover the remaining years of operation. A Closure or Decommissioning Plan will be created for the company's implementation at the end of the project's lifespan.

This ESHIA report is based on field data gathered and data obtained from secondary sources, as specified in the scoping report's Terms of Reference (ToR). This ESHIA report has been divided into eight (9) sections (in addition to the Executive Summary) in compliance with national and international requirements as follows:

Section 1 which is the Introduction

The history of the project, rationale of the project, purpose, objectives, scope, and organization of the study are all described.

Section 2 speaks about the Project Description.

It is concerned with the project's technology and specs. This also addresses infrastructural development as part of the project, as well as pollution sources associated with the planned mining project and project alternatives.

Section 3- Environmental Policy and Legislative Context.

This section contains information about the project's regulatory framework and rules.

Section 4 is the Baseline Environmental and Social Status

This section describes the current environmental and socioeconomic circumstances in the project area. This is important because it will reveal the level of environmental pollution and degradation, the repercussions on socio-economic activities (both positive and negative), and the extent to which recommended mitigation measures have been adopted to mitigate these impacts.

Section 5 – Stakeholder Engagement

Provides an overview of the stakeholder engagement process, also known as the public participation process (PPP), which is carried out not only during scoping but also throughout the study and will be carried out in later stages of the project implementation process. All input from interested and affected parties (I&APs) is meticulously recorded.

Section 6 – Impact Assessment and Mitigation Measures

This part identifies, evaluates, and discusses the potential impacts of the planned mining activities that could create major environmental, health, and social problems. To address these major implications, mitigation strategies have been identified. The cumulative impact as well as mitigations are examined.

Section 7 – Environmental and Social Management Plan

Provides environmental and social management plan recommendations targeted at reducing the project's negative environmental, health, and social consequences. Environmental monitoring requirements have also been devised for successful application of mitigating measures during the mine's construction and operation.

Section 8 The mine decommissioning plan and the Community Development Action Plan (CDAP) were examined.

Section 9 – Conclusion which is a summary of the entire study.

1.0 INTRODUCTION

1.1 Background

Dura Plast (SL) PVT Limited is a company limited by shares registered in Sierra Leone under the Company's Act (Act No.5) of 2009. The company intends to start producing steel in Magbentha Village, Koya Chiefdom, Port Loko District (see figure 1). On the 3rd of August 2017, Dura Plast (SL) PVT Limited was registered and established in Freetown.

The Centre for Environmental Research and Quality Management (CERQM) was hired to conduct an Environmental, Social, and Health Impact Assessment (ESHIA) study for the construction and operation of a steel manufactory in Sierra Leone, as required by the Environmental Protection Agency Sierra Leone (EPA-SL) Act, 2008 and amendment, 2010, which requires all projects specified in The First Schedule, Section 24(f) to obtain an impact assessment license before beginning their activities.

The scoping stage is the third of eight (8) steps in the EIA process. The Scoping Phase is crucial because it addresses the initial significant concerns raised by relevant authorities, Interested and/or Affected Parties (I & AP's), and/or directs the study itself with the Environmental Assessment Practitioner's professional judgment.

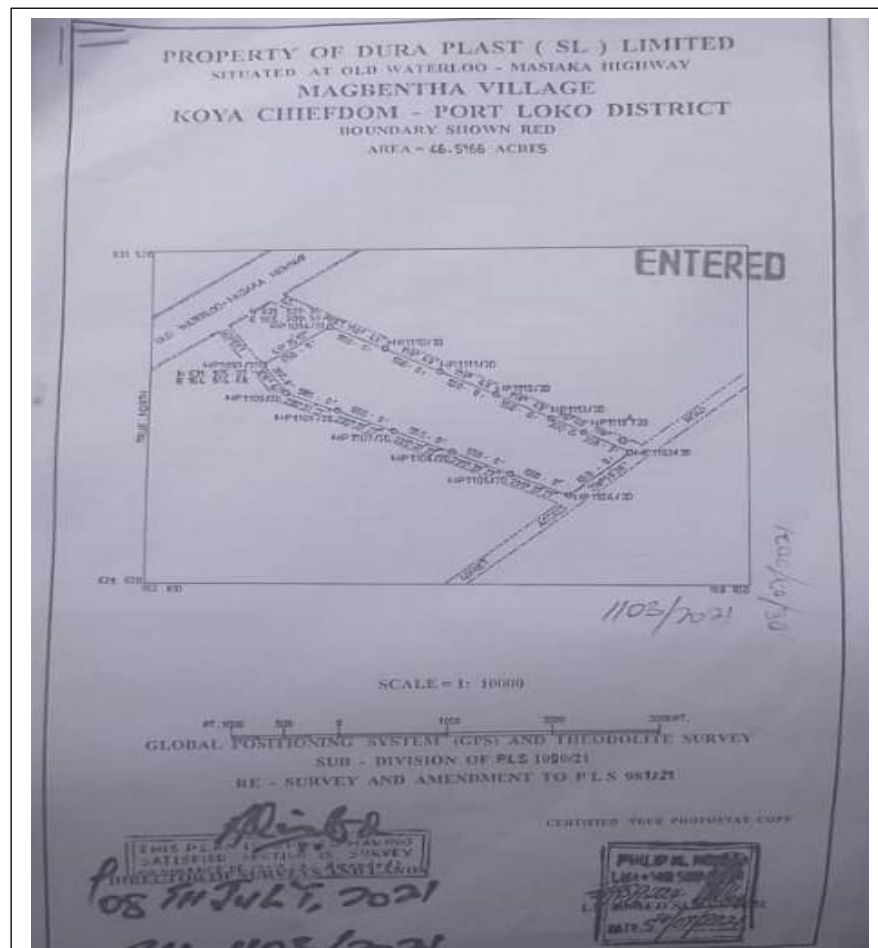


Figure 1: GPS Certified site plan of Duraplast (SL) Limited.

1.2 Scope of the ESHIA Study

This study covers a wide range of environmental studies in the project region, including climate, topography, geology, and soils, hydrology (surface and ground water), biodiversity, cultural heritage, and local socio-economic systems.

The ESHIA assesses both potential negative and positive environmental, health, and social impacts, and recommends strategies to avoid, prevent, minimize, and mitigate negative environmental, health, and social consequences.

The ESHIA established and addressed the following Terms of Reference (TOR).:

- Description and assessment of the operation's current baseline environmental and socioeconomic circumstances
- Policy and legal background related to quarry activities
- Prediction of probable environmental, health, and social implications
- Identifying appropriate mitigation strategies
- Create a Specific Environmental and Social Management Plan (ESMP) that outlines the actions that will be taken to improve environmental quality and the essential environmental attributes that will be monitored.
- Hold a public consultation and disclosure meeting with all stakeholders, including the impacted communities, to get feedback on their concerns and, if possible, recommend further mitigating measures.

1.3 Purpose of the ESHIA Study

The goal of the ESHIA was to conduct a thorough analysis of the effects and recommend appropriate and long-term mitigation strategies.

1.3.1 Detailed Assessment of Impacts

The ESHIA was completed using a systematic method that forecasts and analyzes the Project's potential impacts on physical, biological, socioeconomic, and environmental resources and receptors. The Project will take measures to avoid, minimize/reduce, mitigate, offset, or compensate for detrimental consequences, as well as to increase good benefits whenever possible.

The defining of the Project's Area of Influence (AoI), the description of the baseline conditions, and the implementation of an acceptable impact assessment technique were all part of this procedure. The following is a more detailed description of these:

1.3.2 Defining the Area of Influence (AoI)

The AoI refers to the extent to which a project activity affects a specific physical, biological, or social resource. A description of physical, biological, and socioeconomic (social, economic, and health) conditions that would be expected to exist in the absence of the project is offered in Baseline Conditions and Specialist Studies to provide a context within which the project's consequences can be analyzed.

In order to define the baseline circumstances of the AoI and generate a supplement baseline for the ESHIA report, the following specialist studies were conducted:

- Geology and Soil;
- Flora and Fauna
- Surface and Groundwater;
- Air Quality;
- Current Land Use;
- Noise; and

- Socio-economics (including social, cultural, economic and health aspects).

1.3.3 Assessment Methodology

Scoping began with impact identification and assessment and continued throughout the rest of the ESHIA process. As described below, interactions having the potential for major consequences were submitted to a thorough impact assessment.

- **Impact prediction:** to figure out what might happen to resources or receptors as a result of the project and its connected activities
- **Impact evaluation:** to assess the relevance of the expected impacts by taking into account their magnitude and likelihood of occurrence, as well as the sensitivity, value, and/or importance of the resource or receptor in question.
- **Mitigation and enhancement:** to identify acceptable and justifiable strategies to reduce negative effects and increase favorable effects
- **Residual impact evaluation:** to assess the significance of consequences assuming that mitigation and enhancement strategies are implemented effectively.

1.4 Project Justification

Sierra Leone has a large iron ore resource as well as a large amount of scrap metal. Sierra Leone's steel production industry makes a substantial contribution to the country's infrastructure and economy. Dura Plast (SL) Limited is projected to produce both direct and indirect work opportunities in the communities where it will operate.

This project will also expand opportunities for local, regional, and international businesses to supply goods and services with a strong preference for local content, resulting in increased local commerce in the community's operational area and increased economic growth, particularly in the area of infrastructure development. All steel rods and metals utilized in the infrastructure industry in Sierra Leone and surrounding countries are imported. This effort will help to alleviate the problem. Dura Plast (SL) PVT Limited, as required by the EIA process, will support the community through its Community Development Action Plan (CDAP).

1.5 The Proponent

Dura Plast (SL) PVT Limited successfully acquired 46 acres of property, however only 20 acres will be used in the initial phase of the project, with full ownership of the site. Dura Plast (SL) PVT Limited is a privately held corporation whose primary goal is to purchase and grow Sierra Leone's steel manufacturing industry. The company specializes in producing steel from scrap metals and iron ore.

Dura Plast (SL) PVT Limited is a Sierra Leone-based private limited company with the registration number **SL030817DURAP01954** and the 1090789-8 tax identification number.

The firm's mission is to build a highly profitable steel manufacturing company with long-term shareholder value growth while also providing affluence and opportunity for Sierra Leone's people. Dura Plast (SL) PVT Limited has a philosophy of employing both skilled and unskilled workers from the local area. Their manufacturing approach and equipment selection for this activity are straightforward and easy to learn and apply in order to achieve this.

Table 1 shows the complete contact information for Dura Plast (SL) PVT Limited in regard to this project.

Table 1: Contact Details of Dura Plast (SL) PVT Limited

Name	Mr. Bility
Position	General Manager
Mobile	+23273556633
Mail address	Murray Town Road
Company's address	Hybroad Road-MurrayTown.

1.6 The Consultancy Firm

CERQM (Centre for Environmental Research and Quality Management) is a privately owned Sierra Leonean consultancy founded in 2013 by experienced professionals who provide customized business consulting and services to the Environmental, Manufacturing, and Mining sectors. CERQM has extensive experience in EIAs.

CERQM has a team of highly driven and qualified individuals who have a track record of successfully supporting projects at all stages of conception and implementation. Since 2013, CERQM has undertaken over twenty (20) ESHIA investigations ranging from manufacturing to mining with its trustworthy, dynamic, and highly educated specialists.

Table 2: Contact Details of CERQM

Name	David Conteh
Position	Chief Executive Officer
Mobile	+23276754271
E-mail	davidconteh2015@yahoo.com
Address	50 Bai Bureh Road, Kissy, Freetown

2.0 PROJECT DESCRIPTION

2.1 Overview of the Propose Project,

To avoid any negative environmental impact, the entire steel mill operation must be made as basic as feasible. Potential negative consequences will be given the best possible mitigation. All of this must be included in a comprehensive Environmental, Social, and Health Impact Assessment (ESHIA), which will lead to the issuing of an EIA Licence.

All activities must be conducted in strict accordance with all supporting Acts, Regulations, and Policies that regulate factory operations in Sierra Leone.

2.2 Location of Site

Dura Plast (SL) Limited will be based in Magbentha Village, Koya Chiefdom, Port Loko District, along the Waterloo – Masiaka Highway (see figure 2). Its concession consists of around 46 acres of contiguous plots that include farmland, small gardens, and farm scrub. For this phase of the project, only 20 acres will be used. The project site is a few kilometers from Mile 38 Check Pont on the Freetown-Masiaka Highway. In addition, there are just a few industrial operations in this area. Sierra Lubricant, a used oil recycling facility, wood/timber processing facilities, and the prospective DuraPlast steel manufacturing complex are all closer to this location.

The proposed expansion would include a new smelter plant and administrative structure, which will include offices, a boardroom, restrooms, a canteen, parking, ingress and egress points, loading, stockpiling areas, and delivery zones. The general management functions will be carried out from this location.

Table 3: The Site Perimeter Coordinates

Beacon	GPS northings	GPS Eastings
01	92 91 64	72 81 48
02	92 92 93	72 82 99
03	92 92 59	72 83 29
04	92 90 40	72 84 34
05	92 88 46	72 85 81
06	92 85 70	72 87 40
07	92 85 52	72 84 50
08	92 88 53	72 83 32

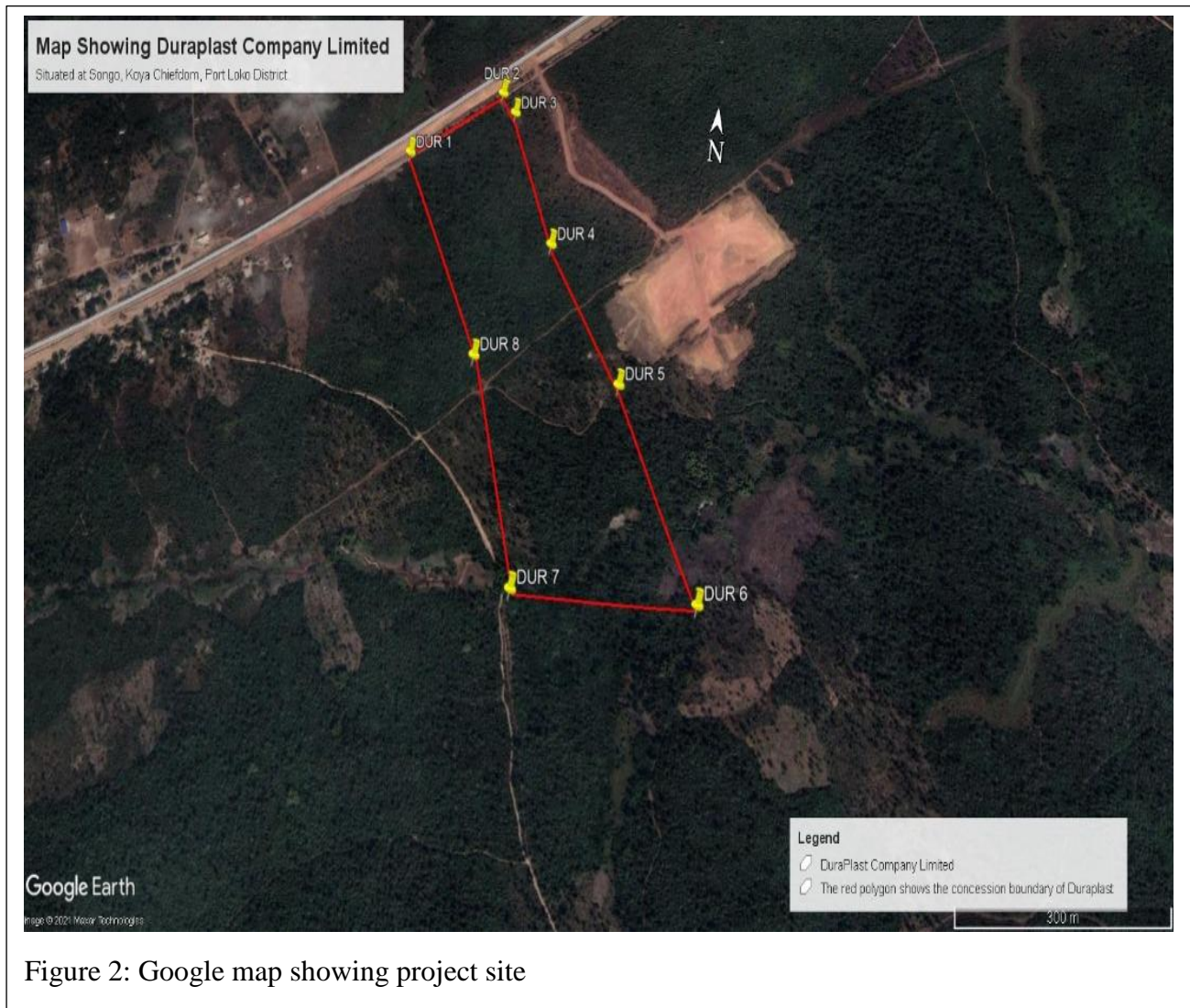


Figure 2: Google map showing project site

2.3 Technology and Industrial Process Description

The plant will be a primary iron ore production facility. Steel made from iron ore accounts for 60-70 percent of global steel production. Iron ore, coal, limestone, and steel scrap are the primary raw resources (from within the plant). The Blast Furnace (BF) is used to produce iron ore, followed by the Basic Oxygen Furnace (BOF) for steel manufacture (BOF).

Coke is the reducing agent for iron ore in the BF. Limestone or dolomite (fluxes) are added to the blast furnace, where they react with impurities like silica in the iron ore. Steel is made in the BOF from pig iron, scrap, and lime, with carbon being burned off with oxygen.

In BOF, oxidized compounds are formed when oxygen, carbon (as gaseous carbon monoxide), silicon, manganese, phosphorus, and some iron as liquid oxides react with lime or dolomitic lime to generate slag. After steel is thrown into a ladle at the end of the refining process, the slag is poured into a vessel and then tapped into a slag pot.

DuraPlast (SL) Limited, the Applicant, intends to bring existing technology/plant from India to Magbentha Village. Iron ore will be obtained from mines in Sierra Leone. The first stage in creating steel is to create the iron that will be used to build it. This is usually accomplished with the assistance

of coal. The blast furnace is fed with raw iron ore, coke, and lime. They produce molten iron (also known as "hot metal") at a very high temperature in this case.

2.4.1 Steelmaking

Steelmaking is divided into two categories: primary and secondary. A basic oxygen steelmaking (BOS) method or an electric arc furnace (EAF) method are used in the main steelmaking process. BOS incorporates recyclable scrap steel/metal into the molten iron. To minimize the overall carbon concentration, oxygen is blasted into this mixture at a very high temperature. However, in EAF, the recycled steel/metal scrap is totally melted and converted to high-quality steel using high-power electric arcs (temperatures as high as 165°C).

Both of these processes are combined in secondary steelmaking. This is done mostly to fine-tune the composition of the steel that is being manufactured. To generate the correct combination, elements are added in certain temperature and environmental settings. Stirring, ladle-furnace, ladle injections, degassing, and Composition Adjustment by Sealed Argon Bubbling with Oxygen Blowing are examples of these controls (CAS-OB).

2.4.2 Steel Casting

The molten iron is then poured into a cooling mold, which shapes it to a degree. It also results in the development of a thin, rigid shell. Guided rollers are used to split this shell. The strands of the shell are pliable and can be manipulated into any form or length depending on their intended usage. Flat sheets, beams, cables, and thin strips are examples.

2.4.3 Primary Steel Forming

This is the final shaping step, where the cast is fine-tuned using hot rollers. The casting flaws are corrected, and the steel is molded into the exact shape and finish that the customer wants. This is the stage where the steel's rough shape develops into definitive shapes, such as pipes, wire rods, bars, rails, and other items.

2.4.4 Manufacturing and Finishing

The secondary forming process, which gives steel products their final shape and qualities, is the final step in steel manufacture. This is accomplished by:

- shaping (cold rolling methods)
- CNC machining (eg. drilling)
- becoming a member (by means of welding)
- zinc galvanising, cold coating, and electro coating are all options for coating.
- the use of heat (usually tempering)
- surface preparation (carburising).

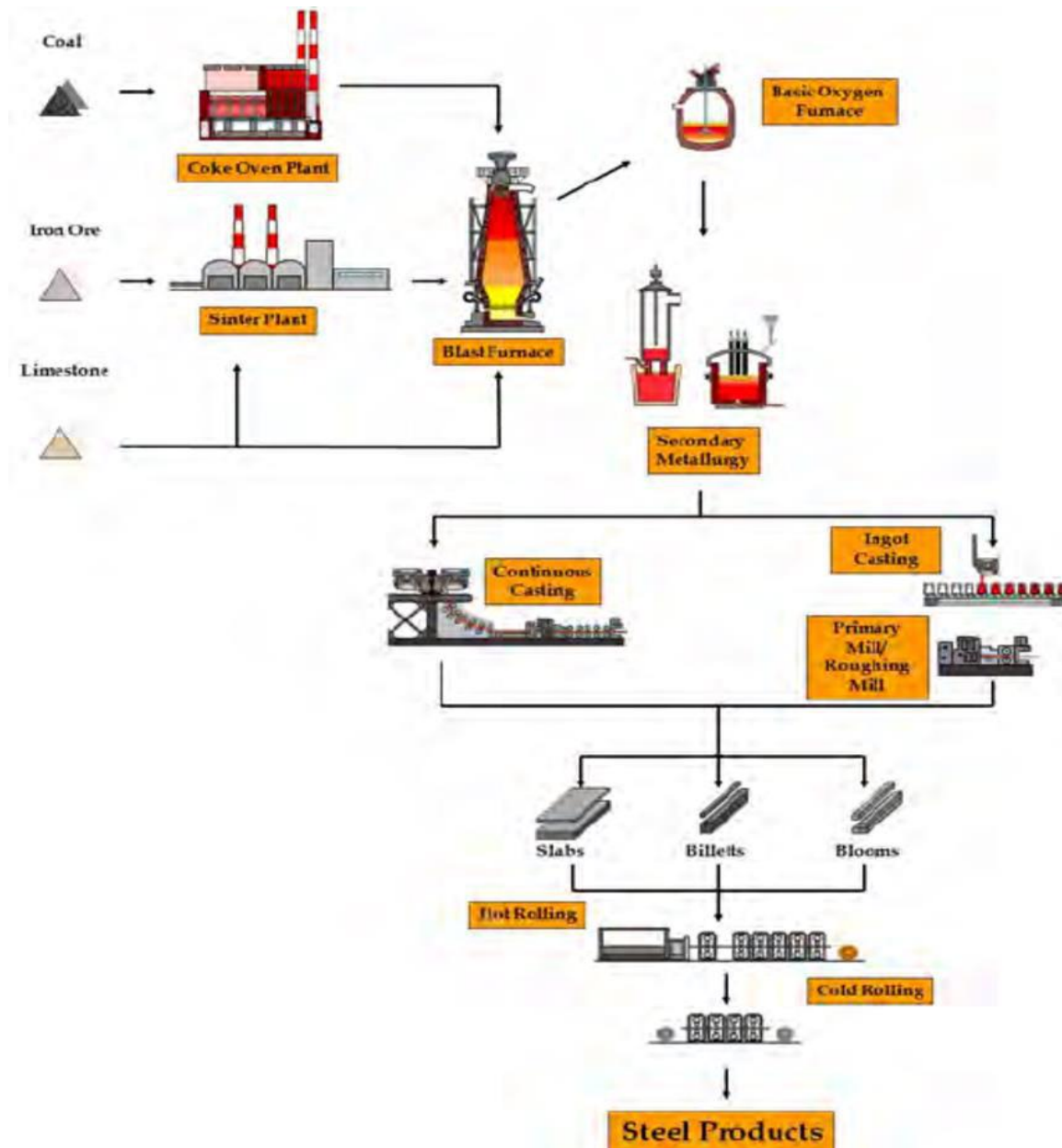


Figure 3: Steel making process from iron ore

2.4.5 The basic steelmaking process steps are:

- Coking of various grades of coking coal
- Agglomeration of Iron Ore fines by sintering
- Iron making in BF
- Lime & dolomite calcination in calcining plant
- Steel making in BOF
- Refining liquid steel in LF followed by VD
- Continuous casting of liquid steel to billets and slabs
- Processing of slabs and billets in the plate & coil and rod mill

2.4.6 Facilities required:

- Coke Ovens & By-products Recovery Plant (COBP)
- Sinter Plant
- Air separation plant
- Blast Furnace and Basic oxygen furnace
- Lime/dolomite calcining Plant
- Steel Melt Shop
- Continuous Casting
- Rolling Mil

2.5 Description of Process

Networks of interdependent material and energy flows between the various production units, such as sinter plants, coke oven plants, blast furnaces, and basic oxygen steel producing facilities with subsequent casting, describe integrated primary steelmaking. Iron manufacturing and subsequent steelmaking processes are the hallmarks of integrated steelmaking.

Table 4: Energy content of fuels and energy carriers:

Fuel	Unit	MJ/unit	Energy carrier	Unit	Energy intensity (MJ/unit)
Coke	kg	28.435	Fresh water	t	2.51
Cleaned coal	kg	26.344	Oxygen	m ³	11.72
Steam (low pressure)	t	3.763	Nitrogen	m ³	11.72
BF gas	m ³	3.763	Argon	m ³	—
Coke gas	m ³	16.726–17.981	Blow	m ³	0.88
			Electricity	KWh	3.6

Source: Lee et al, 2017

2.5.1 Integrated steelworks:

The blast furnace is the main operational unit producing iron (pig iron). The two types of iron ore preparation plants are sinter and pellet plants. Coke and powdered coal are the main reducing agents in the blast furnace. The slag from the furnace is granulated, pelletised or tapped into slag pits. The liquid iron is transported to a basic oxygen furnace where carbon content is lowered. Upstream ladle desulphurization of the pig iron and downstream ladle metallurgy of the steel may also be applied. On leaving the basic oxygen furnace the liquid steel is cast either into ingots or by means of continuous casting.

Sinter Plants: Sintering involves agglomerating the furnace charge, which consists of a mixture of iron ores, additives, iron-bearing, recycled material from downstream operations such as coarse dust and sludge from blast-furnace gas cleaning, mill scale, casting scale etc., to which coke breeze is added for ignition purposes.

- Sinter plant operations include:

- Blending and mixing of raw materials;
- Sinter strand operations;
- Hot sinter screening and cooling

Coke Oven Plants: Coal pyrolysis involves the heating (1,000 – 1,100) of coal in an oxidation free atmosphere to produce gases, liquids and a solid residue (char or coke). This produces blast furnace and foundry cokes. Coke is the primary reducing agent in blast furnaces active both as support material and a matrix through which gas circulates in the stock column.

The coke making process can be subdivided into:

- Coal handling
- Battery operation (coal changing, heating/firing, coking, coke pushing, coke quenching) and coke handling and preparation
- Collection and treatment of coke oven gas
- Coke oven water flows.

Blast Furnace: A blast furnace is a closed system into which iron bearing materials (iron ore, lump, sinter), additives (slag formers such as limestone) and reducing agents (coke) are continuously fed from the top of the furnace shaft through a charging system that prevents escape of blast furnace gas. A hot air blast enriched with oxygen and auxiliary reducing agents (coal, powder, oil, natural gas and in a few cases plastics) are injected on the tuyere level providing a counter-current of reducing gases. The air blast reacts with the reducing agents to produce mainly carbon monoxide, which in turn reduces iron oxides to metal iron. The liquid iron is collected in the hearth along with the slag and both are cast on a regular basis. The liquid iron is transported in torpedo vessels to the steel plant and the slag is processed to produce aggregate, granulate or pellet for road construction and cement manufacture. The blast furnace gas is collected at the top of the furnace. It is treated and distributed around the world to be used as a fuel for heating or electricity production.

The main operations are:

- Charging of raw materials;
- Generation of hot blast
- Blast furnace operation
- Direct injection of reducing agents
- Casting
- Slag processing

2.5.2 Basic Oxygen Steel Making and Casting

The Basic Oxygen Furnace (BOF) is then used to produce steel.

The objective in oxygen steel making is to burn (oxidise) the undesirable impurities in the metallic feedstock. The main elements oxidised are carbon, silicon, manganese, phosphorous and sulphur.

The production of steel by the BOF process is a discontinuous process involving the following steps:

- Transfer and storage of hot metal;
- Pre-treatment of hot metal (desulphurisation);
- Oxidation in the BOF (decarburisation and oxidation of impurities);
- Secondary metallurgical treatment;

- Casting (continuous and/or ingot)

Materials required and sources are presented below in table 4:

Table 5: Materials required for production

Incoming raw materials/additives	Chemical Form	Composition (% w/w)	Source
Iron Ore (Fines)	Solid	Fe = 60-63	Domestic
Iron ore (sized)	Solid	Fe = 62-64	Domestic
Coking Coal	Solid	FC - 64-66 Ash - <8-9	Import
Non Coking Coal	Solid	FC - 64-66 Ash - 9-10	Import
PCI Coal	Solid	FC - 72-76 Ash - 9-10	Import
Limestone	Solid	CaO - 52.3%, MgO - 1.98%, SiO ₂ - 0.99%, Al ₂ O ₃ - 0.52%	Import
Limestone (Fines)	Solid	CaO - 52.3%, MgO - 1.98%, SiO ₂ - 0.99%, Al ₂ O ₃ - 0.52%	Domestic
Dolomite	Solid	CaO - 30.8%, MgO - 19.1%, SiO ₂ - 0.86%, Al ₂ O ₃ - 0.29%	Domestic
Dolomite (Fines)	Solid	CaO - 30.8%, MgO - 19.1%, SiO ₂ - 0.86%, Al ₂ O ₃ - 0.29%	Domestic
Ferro Alloys	Solid	Fe = 28-32	Domestic

Source: Welspun Steel

2.5.3 Storage Facilities:

Solid raw materials, including but not limited to iron ores, coking & non-coking coal, and limestone, will be stored in open stockpiles within the steel plant boundary. PCI coal would be stored in a covered storage area. By-product fuel gases will have buffer storage facilities in respective dry type gas holders.

Slag and other solid wastes (residual material in the plant) available for sale or removal offsite would be temporarily stored in a designated waste storage area within the plant boundary. All storage facilities will be in accordance with best practices and pollution prevention principles (stored within a bounded, impermeable surface area)

2.5.4 Activities to be undertaken

Table 6: List of Project Activities

No.	Activity	Proposed timeframe
1	Road construction	October 2021 - December 2021
2	Bush clearing for camp construction	
3	Facility construction	January – June 2022
4	Transporting of equipment/machinery	July– September 2022
4	Full time manufacturing operations	December 2022

2.6 Service and infrastructure Requirements

2.6.1 Water

According to Dura Plast (SL) Limited, the water requirement for the development will be sourced from a borehole. Available water reticulation services are on site and hence new external bulk infrastructure is required.

However, the approximate water requirement will be confirmed at the EIA stage, and confirmation is still required from the water resources management agency that adequate spare capacity is available to cater for the proposed development. Sewage will be collected via municipal sewers.

2.6.2 Electricity

At present an electrical servitude with pylons, which formed part of the now defunct power plant, lies within the site. Dura Plast (SL) Limited has confirmed that existing electrical infrastructure on site can be used for reticulation to the smelter.

The electricity requirements will be confirmed at EIA stage; confirmation of spare capacity is also required from the electricity authority to supply the development, since the development will be very energy intensive (to be included at EIA stage). EDSA is expected to be the electricity supplier. The operational phase will be energy intensive.

2.6.3 Waste

The removal of general waste is to be provided by the Western Area Rural District Council waste collection services. General and domestic waste will comprise of packaging, wastepaper and refuse.

Slag will be generated throughout operation and stored on site for a limited period, before being removed off site for cement manufacture. In plant excess materials will be reused in the manufacturing process.

Hazardous waste is expected from handling and use of fuels, plastics, lubricants, oil, oily rags, metals, and chemicals. Such waste will be removed from site by a registered waste collection company, for disposal at a registered hazardous waste disposal site.

Waste separation must be undertaken at source on site. Where possible, waste will be reused in the plant or sold to eliminate landfill disposal.

2.6.4 Storm Water

The site lies adjacent to a stream, which drains to the river. A stormwater management plan which locates discharge points will be required for the proposed development in order to conform

to the policies of the local authority, considering that more of the area will be subject to hardened surfaces. Storm water pipes will be constructed at strategic locations to drain surface water if any. Contaminated runoff from the premises must be prevented.

2.6.5 Roads

The main access into Magbentha Village and the project site is the new Freetown – Masiaka Highway. The to the site itself is the old road. A traffic impact assessment will confirm traffic impacts and any potential alternative accesses and recommendations at the EIA stage.

3.0 DESCRIPTION OF ALTERNATIVES

In terms of the environmental legislation, an alternative to the proposed development has to be identified during this EIA process. The Public Participation Process (PPP), specialist study findings and the EIA process may also help to identify other possible alternatives.

Preliminary alternatives to the proposed development have been investigated and are presented below:

3.1 Site Alternative

The preferred site alternative comprises of the site identified in section 2 above.

At present, this is the only site being proposed. The Applicant, DuraPlast (SL) Limited, has purchased the property for this purpose. No site selection matrix has therefore been prepared, however, the positives and negatives of the site are listed below.

Negatives of Propose Site

- The stream forms the Northern boundary of the site and a drainage channel of the Freetown – Masiaka Highway lies to the Southern boundary (these areas will be excluded from development);
- Freetown – Masiaka Highway routed near the site as a boundary line which might require the development of traffic management plan
- Site is located roughly 250m away from the residential areas of Magbentha Village and Magbonthoso (commonly known as Mile 38) residential and security check point

Advantages of Propose Site

- The entire site is expected to be of limited ecological value
- Site is zoned as semi-industrial; light industry is noted to the south east of the site.
- The site is accessible via the existing road network
- Has the ability to contribute towards employment and economic stimulus, as well as encouraging further industrial development in the area
- A high tension voltage line from Bumbuna hydroelectric dam passes through the site with a mounted tower. This will enable easy access to the main national electricity grid.

3.2 Scheduling Alternatives

The development will be constructed in phases. The plant is generally set to operate 24hrs per day, 7 days a week. Compulsory shutdown will occur during certain maintenance operations and emergencies.

3.3 Technology Alternatives

Proposed Alternatives

The alternative proposed is the modern BOF-BF route. This route dominates owing to superior economic efficiency of blast furnaces, especially when it comes to high production volumes such as 1 Mt per year or more. The modern blast furnace is a very efficient technology but requires very well prepared materials.

The blast furnace itself consumes nearly a half of primary energy needed to produce steel, substantial cutting of carbon dioxide emissions in iron and steel industry might be achieved through:

- improvement of energy efficiency through deployment of the BAT;
- increased share of recycled steel production;
- development of new and rapid commercialisation of currently developed innovative iron making technologies;

Alternatives

The alternative that could be used would be the secondary production route, via use of the Electric arc furnace, which features lower emissions and resources consumption. Electric arc furnaces are mainly used to produce steel from purchased scrap steel and is not generally suitable for large quantities of steel productions.

Cupola and other open hearth furnaces are not recommended due to significantly higher emissions, occupational health and safety factors, even higher resource consumption and waste generation.

The modern blast furnace is a very efficient technology; however, being unsuitable for top charging of fine ore and coal, it requires well-prepared raw materials - coke (coal thermal processing product) and sinter or pellets (agglomerated iron ore materials). Coke making and sintering/pelletizing are energy intensive.

3.4 Process and Input Alternatives

Proposed Alternative

Dura Plast (SL) Limited plans to make iron and steel via the primary production route, through the beneficiation of iron ore, imported from outside the province. In addition, steel scraps (off cuts from finished steel products) are fed back into the manufacturing process.

Alternatives

In the future, the plant could transform to a secondary production plant, which can use purchased scrap metal to produce steel. This is a good option, in future, provided that large quantities of scrap metal are available at that stage. Secondary production is a significantly lower consumer of energy and has reduced emissions.

In addition, Hydrogen Direct Reduction uses hydrogen to produce steel. Hydrogen-based steel production could become a major technology option for production from virgin materials, particularly in a scenario where Carbon Capture and Storage (CCS) is not available (Morfeldt et al, 2015).

Viable emerging and currently researched alternatives include the use of plastics in the production process and use of low sulphur coke.

Best Available Techniques

Best available techniques guidelines for primary processing plants must be incorporated. BAT will be briefly discussed in the EIA phase. Deployment of BAT will reduce energy consumption and reduce emissions through cleaner production method recommendations in the plant and is in accordance with IFC guidelines.

BAT will cover energy efficiency, monitoring, and emissions.

3.5 No Go Option

This alternative, suggests that no development will take place on the property and that the existing status should remain, or all alternative land use could be adopted.

The no go option must be adopted in the event that the development will have severely detrimental impacts on the environment which cannot be reduced/mitigated. The EIA phase shall determine whether the 'no go' option should be adopted.

4.0 POLICY AND LEGISLATIVE CONTEXT

This section describes the national and international regulatory policies, legislation and guidelines on Environmental, Social and Health standards related to the proposed project.

4.1 National Policies and Legislations

Legislation governing environmental issues are found as Policies, Acts, and Regulations of the various government line ministries and institutions. Such legislation that are pertinent to the said project includes but not limited to those listed below:

1. The Constitution of Sierra Leone, 1991
2. The National Environmental Policy, 1990
3. The National Lands Policy, 2005
4. The National Local Content Policy, 2013
5. The National Industrial Policy, March 2011
6. The Sierra Leone Trade Policy, June 2010
7. The National Environmental Health Policy, March 2012
8. The Sierra Leone Standards Bureau Quality Policy, 2005
9. The Environment Protection Agency Act, 2008 (No. 11 of 2008) as Amended in 2010
10. The Wildlife Conservation Act, 1972
11. The Forestry Act, 1988
12. The Forestry Regulations, 1989
13. The Factories Act, 1974
14. The Local Government Act, 2004
15. The Local Content Act, 2017
16. The Water Resources Management Agency Act, 2017
17. The National Protected Area Authority and Conservation Trust Fund Act, 2016
18. The Sierra Leone Electricity and Water Regulatory Commission Act, 2011
19. The Consumer Protection Agency Act, 2020
20. The Sierra Leone Standards Act, 1996
21. The Weights and Measurements Act, 2010

These documents are available locally, and can be obtained from the institutions to which the Policies, Acts and Regulations refer, for consultation by potential users of the land, whose activities may have an effect on the environment. Table 3 gives summary of each and their applicability.

Table 7: National Environmental Related Policies, Acts and Regulations

National Regulatory Regime	Summary	Applicability to the Project
The Constitution of Sierra Leone, 1991	The Constitution protects people' rights to private property in the context of mining activities, and it also establishes grounds under which citizens may be dispossessed of their property in the public good, as outlined in Section 21. It also provides for prompt payment of adequate compensation and access to a court or other impartial and independent authority for the purpose of determining the landowner's interest or right, as well as the amount of any compensation to which he or she is entitled, and obtaining prompt payment of that compensation.	The Dura Plast (SL) Limited Project is a development project that utilizes the human and biophysical environment. As a result, an EMP specifying the appropriate mitigation will be used to deal with these problems. A land lease agreement has already been signed, with surface rent being paid to the landowners in accordance with the terms of the agreement.
The National Environmental Policy, 1990	Cabinet has adopted the National Environmental Policy (NEP) since 1990, and it was amended in 1994. (GOSL, 1994). The policy goals are to: 1. Provide a healthy and safe environment for all Sierra Leoneans; 2. Conserve and use the environment and natural resources for the benefit of current and future generations; restore, maintain, and enhance ecosystems and ecological processes essential to the biosphere's functioning; preserve biological diversity, and uphold the principle of optimum sustainable yield in the use of living natural resources. 3. Increase public knowledge and comprehension of the critical connections between the environment and development, as well as individual participation in environmental improvement activities.	One of the major strategies which the Government pursues in achieving the goals of the NEP is to make Environmental Impact Assessments (EIA) a must for all proposed activities that may significantly affect the environment and the use of natural resources (GoSL, 1994). In order to achieve this goal, the EPA-SL Act of 2008 First Schedule, Section 24 clearly states the projects requiring EIA licenses; the Second Schedule, Section 25 states the factors for determining whether a project requires an EIA; and the Third Schedule, Section 26 states the components and contents of EIAs
The National Environmental Policy, 1994 (Revised Edition - October, 1994)	Sierra Leone's National Environmental Policy aims to achieve sustainable development by implementing effective environmental management systems that promote productivity and harmony between man and his environment. It also encourages efforts to prevent or eradicate environmental and biosphere damage, as well as to improve citizens' health and welfare by increasing their knowledge of ecological systems and natural resources. As a result, the policy's main goal is to ensure that all Sierra Leoneans live in a healthy and safe environment. The Environmental	The NEP also has a specific goal and policy for water resource management which ensures adequate quantity and acceptable water quality to meet domestic, industrial, transportation, agricultural and fisheries' needs by accelerating programmes for the utilisation of water for various uses and expanding water quality

	<p>Protection Act of 2008 comes after this policy. The Act, which alluded to the creation of a National Environmental Protection Agency, mandates that certain development operations be preceded by an Environmental Impact Assessment. It also sets the legal and regulatory framework for ensuring that Ac follows strong environmental management standards.</p> <p>The National Environmental Policy is a comprehensive policy that addresses a wide range of environmental and socioeconomic concerns while developing and reinforcing environmental protection requirements. The policy's goal is to highlight key areas for policy development and execution. Within this context, the policy is classed as sectoral, as it considers significant sector goals and strategies for improving environmental management systems' sustainability.</p>	<p>management, monitoring and assessment programmes.</p> <p>Land, water, forest and air resources are major components of the natural environment. Factory operations at all stages are impacting on these resources. Extractive uses of these resources are guided by the various programmes, plans, regulations under the EPA-SL. Adherence to the relevant legal provision is a requirement in the entire course of Dura Plast (SL) Limited operations.</p>
The National Lands Policy, 2005	<p>The National Land Policy of 2005, as stipulated in the Sierra Leone Constitution, allows for the compulsory acquisition of land in the public interest. The following are the policy's guiding principles:</p> <ul style="list-style-type: none"> • The concept of land as a common national or communal property resource held in trust for the people and required to be used in Sierra Leone's long-term interests. • Lands acquired through compulsory government acquisition will receive fair and adequate compensation, which will be established, among other things, through talks that take into account government investment in the area. • Local governments (City and District Councils) have the authority to negotiate for land for project development, but such grants must be properly documented and processed. • No right or interest in land belonging to a person or family can be sold or transferred without first consulting the owner or occupier of the land. <p>No right or interest in land belonging to an individual or family can be taken away without payment of fair and adequate compensation in a reasonable amount of time.</p>	<p>Applicable. Due process of purchasing the land agreement was followed to the letter</p>

National Regulatory Regime	Summary	Applicability to the Project
The Local Content Policy, 2013	<p>The National Local Content Policy (2013) allows local/indigenous enterprises and individuals to get the most benefits from the country's growing private investment.</p> <p>According to page 9 of the local content policy. "The policy fosters the expansion of the private sector by building linkages with foreign direct investments through expanded usage of Sierra Leonean local content." The policy includes measures to encourage the use of locally sourced goods and services, to promote domestic small and medium enterprises through targeted private and government procurement, to encourage employment and training of Sierra Leoneans at all levels of management, and to facilitate the transfer of knowledge and skills from large foreign and domestic investors to local small and medium enterprises.</p>	Applicable
The National Industrial Policy, March 2011	<p>Manufacturing is a sector included as one of the components that essentially make up Sierra Leone's industrial sector in Chapter 3 (Industrial Development) of the 2011 Policy. Section K (Environmental Protection) of Chapter 3 also places a focus on promoting policies that will ensure:</p> <ol style="list-style-type: none"> 1. environmental preservation, protection, and improvement; and 2. human, animal, and plant life and health protection. 	Because the steel manufacturing plant would be one of the most important industrial sectors that contributes significantly to the economy, such a policy is extremely crucial to the steel manufacturing sector.
The Sierra Leone Trade Policy, June 2010	<p>Sierra Leone's Trade Policy was formed with a goal to not only re-establish the conditions that would enable the country's economic and social progress, but also to foster long-term growth. Effective environmental management and protection are regarded vital in order to accomplish this long-term growth. That is why the Policy's Section 3.7.4 (Consumption and Environment) stated explicitly that "Sustainable development, a factor in determining long-term consumer welfare, depends on environmental conservation, among other things." Environmental protection, on the other hand, comes at a cost and may need a trade-off with other economic</p>	In this vein, promoting sustainable consumption patterns while also promoting environmental protection is a fundamental component of the policy's goal of long-term growth. As a result, the government's commitment to promoting public awareness among individuals in the trade about the necessity of environmental protection and environmentally friendly purchasing

	interests, as well as changes in consumption patterns. Environmental conservation and sustainable consumption must be prioritized."	patterns is critical. Dura Plast (SL) Limited isn't particularly noteworthy.
The National Environmental Health Policy, March 2012	<p>The purpose of this policy is to promote environmental health. The Policy outlines basic sanitation measures, including the provision of safe and enough drinking water as well as enhanced sanitation in both urban and rural areas. The prevention and control of communicable diseases, as well as the strengthening of public health agencies, are also addressed. As a result, this policy paper is an important addition to the National Health Policy (promulgated in 1993).</p> <p>The following topics of the policy in terms of this project are covered:</p> <ul style="list-style-type: none"> • Environmental Health Administration • Manpower and manpower development • Environmental Sanitation and Water supply • Waste Management • Food Hygiene • Occupational Health and industrial Hygiene • Housing and Vector control including Entomology • Environmental Health Information and its effective use • Control of Communicable Diseases • Legislation and Prosecution 	<p>This Policy still remains critical in the implementation of this project especially in the following areas:</p> <ul style="list-style-type: none"> • Control of Communicable Diseases • Occupational Health and industrial Hygiene • Waste Management • Environmental Health Administration • Manpower and manpower development • Environmental Sanitation and Water supply
National Regulatory Regime	Summary	Applicability to the Project

<p>The Environment Protection Agency Act, 2008 (No. 11 of 2008) as Amended in 2010</p>	<p>The Environment Protection Agency (EPA-SL) was founded by this Act to ensure effective environmental protection and other relevant problems. This Act establishes the organization, administration, and different powers and rules for Sierra Leone's successful management of environmental issues.</p> <p>Part IV of the Environmental Protection Act focuses solely on the types of projects that require a comprehensive Environmental and Social Impact Assessment and describes how to get an environmental license. The Act also lays out the steps for obtaining licenses for existing and proposed projects, such as mining, by conducting an environmental impact assessment study.</p> <p>Sections 25 and 26 discuss considerations to consider when assessing whether or not a project requires an environmental impact assessment, as well as the contents of such an assessment.</p>	<p>The propose Steel factory project is enlisted</p>
<p>The Wildlife Conservation Act, 1972</p>	<p>The Animal Conservation Act of 1972 was enacted to help control the use and protection of Sierra Leone's wildlife resources. Section 3 of this Act, on the other hand, is intended to establish tight natural reserves to safeguard the land, flora, and animals from damage and injury by any activities or projects.</p> <p>The Wildlife Conservation Act of 1972 was revised in 1990 (the Wildlife Conservation Amendment Act), which includes term redefinitions, as well as other changes and qualifications.</p> <p>Furthermore, the wildlife regulations of 1997 provide for the purchase of hunting licenses and permits in selected areas. Any violation of the licensing terms can result in the authorities revoking the license.</p>	<p>This project's location is not designated as a protected area. There isn't a single piece of wildlife that has been identified. As a result, this Act isn't relevant.</p>
<p>National Regulatory Regime</p>	<p>Summary</p>	<p>Applicability to the Project</p>

The Forestry Act, 1988	According to Section 18 of the Forestry Act, the Chiefdom Authorities or Local Council of any chiefdom may conclude an agreement with the Chief Conservator of Forests providing for the establishment as a community forest of any land within the chiefdom, subject to the approval of the District Officer for the District in which the land is located,	The activities of Dura Plast (SL) Limited will involve the clearing of natural vegetation only not forest within its operational area.
The Forestry Regulations, 1989	<p>These regulations went into effect on July 1, 1990. The Chief Conservator has the same obligations as the head of the Forestry Division under the Act of 1988.</p> <p>Community woods are managed by the Forestry Division or by arrangement with the Division; local government; or the Community Forest Association.</p> <p>As stated in section 21, subsection (2) of the Forestry Act - 1988, no protected forest may be tampered with in any way without written authorization from the forest's Chief Conservator.</p> <p>Except as approved by a clearance license, no land between the high and low water marks, nor those above the high-water mark on both sides of the bank of any river, covering a distance of one hundred feet (about 33m), shall be cleared of any vegetation (Section 38 of part XI).</p> <p>Sacred bushes are protected by Section 40 laws, which state that clearing vegetation from land classified as a sacred bush is banned unless the Chief Conservator gives permission.</p>	The said site is not designated as community forest
The Factories Act, 1974	<p>The Factories Act of 1974 deals with issues of factory workers' Occupational Health and Safety. Based on the following parameters, a portion of the building activity falls inside the definition of a factory.</p> <p>According to Part II section 3(v), "any premises in which mechanical power is utilized in connection with the making or repair of goods of metal or</p>	A site camp will be constructed and the operations shall be purely mechanical

	<p>wood ancillary to any business carried on for the purpose of commerce or profit,"</p> <p>Machine safety, safe working conditions, hygienic amenities, frequent inspections, factory registration, and instructions for reporting injuries, accidents, and industrial diseases are all covered by the Factories Act.</p>	
The Local Government Act, 2004	<p>The Local Councils are established as the highest political authority in the community, with legislative and executive functions to be exercised in line with the provisions of this Act. The localities, namely districts, towns, and cities, are established in Section 2 of the Act's First Schedule. The number of Paramount Chiefs in each Local Council is also determined in Part II of this schedule. The Third Schedule lays forth the responsibilities that have been delegated to local governments. The Fourth and Fifth Schedules establish departments, as well as a Valuation List and Rate Books, under each Local Council.</p>	<p>Consultation with the public and participation in the community are important aspects of the company's operations. The Community Development Action Plan is being implemented in conjunction with the local council and other relevant stakeholders.</p>
The Local Content Agency Act, 2017	<p>This Act creates the Local Content Agency, whose primary responsibility is to carry out the Local Content Policy. The minimum Sierra Leone local content in any project to be performed in the sectors covered by this Act must be compatible with the standards set out in this Act, according to Section 31(1). Operators, alliance partners, and contractors must comply with the minimum Sierra Leone local content for a specific project item, service, or product specification set out in this Act, according to Section 31(2). In addition, Section 31(3) stated that, notwithstanding subsection (1), the Minister may permit the continued importation of the relevant commodities if there is insufficient capacity to satisfy any of the Act's targets.</p> <p>In terms of service provision, for projects and activities covered by this Act, priority would be given to service agencies based in Sierra Leone and controlled by residents. These service organizations must have the resources and capacity to add value to their operations, projects, or</p>	<p>This project is not an exception in implementing the provisions of this Act in its operations.</p>

	activities. Furthermore, where the quality and timely delivery of materials, products, or goods created in Sierra Leone are similar to those available internationally, such materials, products, or goods shall be given first consideration. Sierra Leonean enterprises that provide materials, products, or goods must have sufficient resources and capacity to provide value to such agencies' operations, projects, or activities. Many considerations in terms of capacity building were also made.	
The National Water Resources Management Agency Act, 2017	The Agency was founded with the goal of regulating, utilizing, protecting, developing, conserving, controlling, and managing water resources across Sierra Leone.	Dura Plast (SL) Limited will extract water from a bore hole for personal hygiene and housekeeping purposes.
The National Protected Area Authority and Conservation Trust Fund Act. 2016	<p>The Responsibility was created with the goal of exercising oversight authority over National Parks and Protected Areas designated for conservation purposes in order to maintain the fauna and flora in their natural state, promote sustainable land use practices, and manage the environment.</p> <p>Furthermore, the Authority is responsible for: (a) ensuring the protection of natural ecosystems and threatened biodiversity in Sierra Leone, including the establishment and maintenance of representative and sustainable samples; (b) overseeing the management of local and private nature reserves and sanctuaries throughout Sierra Leone, including zoos and wildlife rescue and rehabilitation centers; (c) supervising the management of wildlife outside conservation areas; and (d) rehabilitating wildlife outside conservation areas.</p>	The land purchased for this project does not fall within a designated protected or preserve area. In addition, no threatened or endangered species have been discovered in this area.
National Regulatory Regime	Summary	Applicability to the Project

The Consumer Protection Agency Act, 2020	<p>The Consumers Protection Agency was established primarily to monitor the operation of consumer markets in Sierra Leone and to consider how they might be improved for the long-term interests of consumers, as well as to make recommendations to the Minister on</p> <ul style="list-style-type: none"> a) Consumers' right to safe, high-quality goods and services b) Misleading or deceptive conduct. c) The supplier must not use deceptive language. d) Terms of a consumer contract that are unfair. 	For a successful and profitable customer connection, all sections in this Act must be strictly adhered to.
The Sierra Leone Standards Act, 1996	<p>The Sierra Leone Standards Bureau (SLSB) was created by the Standards Act No 2 of 1996, with the responsibility of coordinating Standardization and Quality Management activities in Sierra Leone. SLBS is also mandated by the Weight and Measures Act No 5 of 2010 to authorise and validate the use of the metric system of measurement in Sierra Leone.</p>	Applicable
The Weights and Measurements Act, 2010		

4.2 International Regulations and Guidelines

Sierra Leone is a signatory to many other related international conventions and treaties that are applicable to the proposed project. These are:

- The Rio Declaration: 1992;
- Agenda 21
- Convention on Biological Diversity
- The United Nations Framework Convention on Climate Change (UNFCCC), 1992
- Convention on Biological Diversity (CBD);
- Convention on the International Trade of Endangered Species - (CITES).
- Global Compact Principles
- Convention Concerning the Protection of Workers against Occupational Hazards in the Working Environment due to Air Pollution, Noise, and Vibration (ILO No148)
- World Conservation Union (IUCN) Protected Areas Categories, 1994.
- International Funding Cooperation (IFC) Standards
- World Bank Group Environmental and Social Framework

Table 6: International Environmental Regulations and Guidelines

Title	Summary
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The Rio Declaration:	<p>The Earth Summit in Rio de Janeiro in 1992 produced five (5) documents, one of which was this Declaration on Environment and Development. The Rio Declaration contained 27 principles that were meant to guide future global sustainable development. For this particular project, the following principles are applicable:</p> <ul style="list-style-type: none"> • To avoid environmental damage, take a preventive approach (Principle 15) • Conduct environmental impact evaluations with the full participation of the public (Principle 10) • Indigenous peoples and their communities should be included in development projects (Principle 22)
Agenda 21:	<p>Agenda 21 is the result of the 1992 United Nations Conference on Environment and Development (UNCED), which specifies a variety of environmental policy and management concerns for a more sustainable pattern of development in the twenty-first century. The Agenda 21 action programmes defined twenty-seven (27) environmental principles for the protection of environmental resources. This project falls under one of its principles, which states that environmental impact assessment should be a national instrument and should be carried out for proposed activities that are likely to have a significant negative impact on the environment and are subject to a decision by a competent national authority (Principle 17).</p> <p>Comments:</p> <p>Sierra Leone joined the Convention as a signatory in 1994. The parties to this convention declare their ownership of their natural resources while ensuring that they are utilised sustainably.</p>
Convention on Biological Diversity:	<p>The law went into effect on December 29, 1993.</p> <p>Sierra Leone is a country in West Africa. The 12th of December, 1994, was the date of accession.</p> <p>The preservation of biological variety, the long-term use of its components, and the promotion of a fair and equitable distribution of the benefits derived from the use of genetic resources. Proper access to genetic resources, as well as appropriate technological transfer, are all part of the equitable sharing of these resources, which takes into account existing rights to such resources and technology.</p>
The United Nations Framework Convention on Climate Change (UNFCCC): 1992	<p>Sierra Leone's law went into effect on September 20, 1995.</p> <p>This agreement aims to keep greenhouse gas levels in the atmosphere stable at a level that prevents dangerous anthropogenic influence with the climate system.</p>

<p>Convention on International Trade of Endangered Species (CITES)</p>	<p>Signed on March 3, 1973, and amended on June 22, 1979 in Bonn.</p> <p>Sierra Leone is a country in West Africa. Date of admission: October 28, 1995. The 16th of January, 1995, was the date on which the law became effective.</p> <p>This convention is an international agreement aiming at prohibiting foreign trading in plant specimens and reducing the risk of extinction for these species. The Convention's Appendices I, II, and III contain lists of species that have different levels or forms of protection from over-exploitation. Appendix I contains the most endangered species, while Appendix II contains species that are not currently threatened with extinction but may become so if trade is not strictly regulated. Appendix III is a list of species that were added at the request of a Party that has previously regulated them.</p> <p>Appendix III is a list of species added at the request of a Party that has already controlled trade in the species but needs other nations' help to prevent unsustainable or unlawful exploitation.</p>
<p>Global Compact Principles:</p>	<p>Human Rights: Businesses should support and respect international human rights within their sphere of influence, and guarantee that they are not involved in human rights violations.</p> <p>Labour Standards: Businesses should support the freedom of association and the effective acknowledgment of the right to collective bargaining, as well as the eradication of all types of forced and compulsory labour, the effective prohibition of child labour, and the elimination of employment and occupation discrimination.</p> <p>Environment: Businesses should take a precautionary approach to environmental concerns, launch activities to promote greater environmental responsibility, and promote the development and spread of ecologically friendly technologies.</p> <p>Comments:</p> <p>The establishment of a national policy on environmental impact assessment was guided by the Global Compact Principles.</p>
<p>Convention Concerning the Protection of Workers against Occupational Hazards in the Working Environment due to Air</p>	<p>This is an International Labour Organization (ILO) Safety and Health in Mines Convention that was established in 1995 to define the principle of national action in the mining industry to enhance working conditions.</p> <p>Sierra Leone joined the convention as a signatory in 1961. Participating Parties may accept the convention's obligations in the areas of air, noise, and vibration pollution separately. National laws and</p>

<p>Pollution, Noise, and Vibration (ILO No148)</p>	<p>regulations, as specified in the Factories Act of 1974, will be used to address occupational hazards connected with these impacts.</p> <p>Policy Response</p> <p>Dura Plast (SL) Limited understands that the safety and security of its employees and the communities in which it operates is a critical component of its business. It creates an environment in which people believe that working without being injured is feasible, regardless of the role they play.</p>
<p>World Conservation Union (IUCN) Protected Areas Categories, 1994.</p>	<p>This program was created to make it easier to collect and disseminate comparable data, as well as to promote communication across countries about how to manage similar ecosystems. The goal of the protective status is to preserve biodiversity and natural resources, and the activities must have a clear legal or social foundation. Remote, national park, natural monument, habitat/species management area, protected landscape/seascape, and managed resource protected area are the six types of protected areas. There are no particular management criteria for operations in Protected Areas in this effort. In protected regions, however, there are useful principles for interacting with local communities (and safeguarding and supporting their rights and livelihoods).</p>
<p>International Funding Cooperation (IFC), World Bank Group Performance Standards</p>	<p>The IFC Sustainability Framework expresses the IFC's strategic commitment to sustainable development and is a key component of the organization's risk management strategy. The Policy, Performance Standards, and Access to Information Policies of the IFC are all included in the Framework. The Performance Standards are accompanied by a collection of Guidance Notes that provide customers with assistance in satisfying the Performance Standards.</p> <p>Following an 18-month consultation process with stakeholders around the world, the Framework was accepted in 2006 and amended in 2012.</p> <p>“The Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities” IFC Performance Standards 2012”</p> <p>In order to translate this objective into successful practical outcomes, the IFC has adopted a comprehensive set of performance standards as follows:</p> <ul style="list-style-type: none"> • Performance Standard 1: Assessment & Management of Environmental and Social Risks and Impacts

	<ul style="list-style-type: none">• Performance Standard 2: Labour and Working Conditions• Performance Standard 3: Resource Efficiency and Pollution Prevention• Performance Standard 4: Community Health, Safety and Security• Performance Standard 5: Land Acquisition and Involuntary Resettlement• Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources• Performance Standard 7: Indigenous Peoples• Performance Standard 8: Cultural Heritage
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5.0 PUBLIC PARTICIPATION PROCESS

Stakeholder participation was developed immediately from the screening stage, allowing authorities and project communities to be informed throughout the whole ESHIA process.

As a result, it is critical to determine which organizations, groups, and individuals may be directly or indirectly affected by the Project, as well as who should be involved and who has a stake in the project. Stakeholder involvement is an important part of the ESHIA process since it allows stakeholders to express their opinions on the project and have a say in important decisions. It entails sharing information and knowledge, listening to others' concerns, and forming collaborative connections, allowing stakeholders to understand the project's risks, impacts, mitigation methods, and opportunities in order to achieve beneficial outcomes.

As a result, a number of stakeholders have been identified and contacted. This section was created using information gathered through interviews with the study's identified stakeholders.

5.1 Identified Stakeholders

At various levels, from national to local, the following well-known stakeholders were involved. They made a lot of remarks, which are listed here.

5.1.1 National Level Stakeholders

- Ministry of Lands, Housing and Country Planning
- Ministry of Agriculture and Forestry
- Ministry of the Environment
- Environment Protection Agency Sierra Leone
- Ministry of Local Government and Rural Development
- Ministry of Trade and Industry
- Ministry of Labour, Employment and Social Security
- Ministry of Social Welfare
- National Protected Area Authority
- Meteorological Agency Sierra Leone
- Ministry of Health and Sanitation
- National Water Resources Management Agency
- Electricity and Water Regulatory Commission
- Corporate Affairs Commission
- Ministry of Works, Housing and Infrastructure
- Sierra Leone Police
- Republic of Sierra Leone Armed Forces
- Consumer Protection Agency
- Sierra Leone Standards Bureau

5.1.2 District Level Stakeholders

- Chairperson of Port Loko District Council
- Senior/District Officer(s)
- District Medical Officer, District Health Management Team
- District Agriculture Officer
- District Forestry Officer
- Senior Forest Guard
- Environment Protection Agency Sierra Leone Regional Officer
- Environmental and Safety Officer of Port Loko District Council
- Local Unit Commander, Sierra Leone Police

- NGOs, CSOs and CBOs

5.1.3 Local Level Stakeholders

- Paramount Chief
- Chiefdom Speaker
- Section Chief for the section hosting the project area
- Town Chiefs/Headmen for the village(s) within the project area
- Head Teachers of Primary and Secondary Schools in project area respectively
- Health Workers
- Land owners
- Religious Leaders
- Councillor(s)
- Women's Leaders
- Youths Leaders

5.1.4 Consultation Process

Identifying and responding to society's evolving expectations about how businesses should be conducted can be difficult for businesses. Soliciting, collecting, and documenting the perspectives of potentially impacted people and interested parties ensures that the project design and the ESHIA reflect the stakeholder base's aggregate views. Stakeholder consultation is the key technique by which firms can address such difficulties in the context of an environmental assessment (see Table 7 for the consultation process). Consultation also aids in identifying and involving directly affected communities and other stakeholders, as well as understanding their needs, concerns, ideas, and values in regard to the proposed project. Stakeholder engagement is a continuous process that may include one or more of the following elements to varied degrees: Stakeholder analysis and planning, information disclosure and distribution, consultation and involvement, a grievance mechanism, and regular reporting to Affected Communities are all things that need to be done. The consulting firm will develop a Public Consultation and Disclosure Plan (PCDP) as part of the ESHIA process for the Dura Plast Steel Manufacturing Plant at Makandeh Village, which will define a technically and culturally appropriate approach to consultation and disclosure consistent with the local cultural norms of the area and of Sierra Leone as a whole. The proposed consultation will take place in four stages during the course of the project's lifecycle, as detailed in Table 7 below:

Table 7: Proposed Stakeholder Consultation Process

ESHIA coping	Stakeholder Identification at local, regional and national levels
	Development of Public Consultation and Disclosure Plan
	Preliminary Public Meetings
	Key Issues Identification and Input into Scoping Report
ESHIA Development	Approval of Terms of Reference for the ESHIA studies with EPASL
	In-depth Consultations with Public, national and district authorities
	Key Issue Identification and input into Draft ESHIA
	ESHIA Disclosure Meetings

ESHIA Disclosure	Incorporate Issues raised into PCD Report and submit to EPA-SL
ESHIA	On-going Consultations through operational phase of the project

5.2 Objectives of Stakeholders Engagement

The objectives of stakeholders' engagement throughout the ESHIA process are to:

- involve stakeholders in the scoping and creation of effects, mitigation, and management strategies;
- create a transparent, inclusive, and culturally appropriate accessibility to information regarding the project;
- deliver comprehensive, reliable, and easily comprehensible information in a timely manner;
- Engage with vulnerable people in an open and inclusive manner, taking great precautions to ensure that their viewpoints are taken into account.
- develop a two-way open conversation with stakeholders to deepen their ties with the company;
- consistently connect with stakeholders and provide correct information to understand and manage their expectations; and
- infuse the ESHIA study with stakeholder knowledge and expertise; For projects with potentially significant adverse impacts on affected communities, international standards require "informed" consultation and participation, where this can be understood to mean:
 - an in-depth exchange of views and information;
 - an organised and iterative consultation leading to the incorporation of Affected Community views into the Project decision making process;
 - capturing both men's and women's views, if necessary, through separate forums or engagements; and
 - reflecting men and women's different concerns and priorities about impacts, mitigation mechanisms, and benefits, where appropriate.

5.3 General feelings and concerns raised during public consultation

Stakeholders consulted expressed the following opinions, some of which were used in the identification and analysis of impact and mitigation measures.

- Alternative livelihood assistance packages will be given, as the project's concession region is heavily used by farmers and artisanal miners.
- When necessary, compensation or rewards for crops.
- Employment: The nature and scope of employment opportunities associated with the operation, as well as the impact of the Local Content Policy on affected community recruiting. Prioritize the transfer of skills.
- Education: During the scoping visit, the necessity for scholarships was also mentioned.
- Electrification: Stakeholders anticipate the installation of solar street lights at strategic locations across Magbentha Villages.
- Health: Construction of a clinic and staff quarters to ensure that medical crises are handled efficiently.

The following is a list of potential concerns that may occur as a result of the quarry's operation.

5.3.1 Agricultural Activities

The Magbentha village is mostly a subsistence farming settlement. For personal consumption and commercial purposes, a wide range of fruits and food crops are grown on small and large scales. Oil palm, citrus, and mango are the cash crops farmed. Rice, cassava, and potatoes are among the major food crops grown. Upland rice farms were typically tiny among the agricultural land. People also augment farming activities to make up for deficits and generate extra money while waiting for harvest, which takes around five to six months after planting, which is normally done from November to December. In each family unit's economic activity, all family members contribute to the labor pool. Males take on key roles in agricultural activities. Females, for example, play an important role in agricultural activities. Females also play an important role in farming chores such as weeding, land preparation, and harvesting.

Farmers are believed to have had a poor productivity rate in rice growing over the years, claiming that they do not get enough. According to the report, this is largely due to dwindling farmland due to rising labor costs and a lack of fertilizers for their lowland fields. Bike riding and small companies are two other sources of income. The community is concerned about remuneration packages and whether or not they will enable them to study elective likelihood options and job opportunities. It was proposed that the proponent create a plan to assist in community betterment.

5.3.2 Livestock

Free-range livestock can be found in this neighborhood. Sheep, goats, and chicks were among the many livestock present in the village; these are community-raised livestock. These animals are released early in the morning and returned late at night. They are housed in little sheds outside the owners' dwellings. This indicates that veterinary services are inadequate, which may limit their ability to expand above subsistence levels. Despite its modest size, livestock plays an important role in the economics of various sections of the Chieftdom and the District. Aside from their economic value, these creatures provide a significant source of protein and food. Locals use livestock as an asset and an investment, as well as to build status, wealth, and pride. As a result, there are concerns that they will be lost as a result of the quarry company's operations.

5.3.3 Market:

There is no market in the project area, so most of the trading takes place in their separate homes rather than in a market.

5.3.4 Traditional and Cultural places:

Traditional and cultural values and traditions are held in the project communities, as well as society shrines and other covert cultural rituals. Male and female secret societies, graves, family cemeteries, and shrines are among the culturally significant sacred sites located distant from the proposed project area.

5.3.5 Crime Rate:

According to reports, there is a low percentage of crime in the town, such as fighting and stealing. According to the survey, the crime rate has decreased as a result of persons involved in such activities engaging in livelihood activities that enable them produce revenue.

5.4 Community consultation

5.4.1 Objectives of the community Consultation

The community discussions are primarily focused on developing a program for multi-directional communication between Dura Plast (SL) Limited and all affected individuals. The consultations' precise goals are as follows:

- Ensure that all project stakeholders, including the impacted communities, are kept up to date on the project's actions throughout the duration of its operations.
- Ensure that all stakeholders involved have an adequate opportunity to express their ideas and concerns as the plans progress.
- Educate residents in the surrounding communities about the nature and magnitude of the impacts of steel manufacturing operations on their lives, and encourage their participation in the activity's lifetime.
- Compile a list of community and stakeholder support for the operation.
- Increase community awareness, understanding, and acceptance of the operation by involving stakeholders in community development programs, monitoring, and mitigating measures.
- Build on the strategies for public consultation that have been in place from the start of the project.

5.4.2 Lack of Good Water Quality

Water-borne infections are frequently the result of poor hygiene, which is typically the result of inadequate sanitation in conjunction with poor drinking water sources. Water-borne infections and illnesses are less likely to occur in households with improved sanitation, such as better toilet facilities and clean drinking water. Drinking water from non-improved sources, such as unprotected hand dug wells, unprotected springs, and surface water, is more likely to include disease-causing agents that can harm human health. Respondents were asked about their drinking water sources, those who generally collect the water, and water treatment before consuming as part of an assessment of the current socio-economic conditions in the research region. The most prevalent sources include rivers, bore holes, and unprotected hand dug wells. The most prevalent sources of drinking water in the project area villages are rivers, bore holes, and unprotected hand dug wells.

A borehole serves as the community's primary supply of portable water. The stream(s) are also used by a large portion of the population for household purposes such as bathing, laundry, and recreational swimming. As a result, the community is extremely susceptible to waterborne infections.

The following concerns, which have been raised by the mentioned Ministries, Departments, and Agencies, describe probable issues that may develop as a result of the steel production plant's functioning.

a) District Council: The Council, as the District's top government authority, stated the following reservations about the project:

- Contribution to programs that promote sustainable development; commitment to the Community Development Action Plan (CDAP) and corporate social obligations
- Local communities' rights must be protected.

- Royalties and tax compliance are two things that come to mind when it comes to royalties.
 - Lack of coordination between the Council and the EPA-SL
- b) Ministry of Agriculture and Forestry (MAF):** The Ministry of Agriculture has highlighted the following concerns about the steel manufacturing plant's development and operation:
- deforestation issues caused by forest and vegetation cutting and clearing
 - Communities are being relocated to avoid all forms of risks.
 - River(s) contamination, if any
 - Agricultural feeder roads and bridges are being built.
 - Preventing the extinction of biodiversity
- c) Chiefs, Women and Youth Leaders:** Chiefs, women, and youth leaders expressed the following issues/concerns during the mine's development and operations.
- Scholarships and schools are in short supply.
 - a scarcity of technical institutes
 - a scarcity of safe drinking water
 - Poor road and bridge construction
 - After the mining is finished, the sites must be rehabilitated.
 - Employment opportunities for teenagers
 - Toilets are available.
 - Agribusiness aid
- d) Local Unit Commander (LUC)–Magbonthoso Police Station:** LUC expressed the following concerns about the company's operations.
- When the population grows, the crime rate rises, and security patrols are increased.
 - Only a few security men were assigned to patrol the entire area under his jurisdiction.

This chapter describes the planned Dura Plast (SL) Limited operation site at Magbentha Village's environmental and social baseline. This baseline is mostly based on primary data and a review of secondary sources.

Understanding the physical, ecological, and socioeconomic characteristics of the Project Area and its surroundings is critical since it will help to better comprehend the environment in which the Project will be executed. Identification of potential environmental and socioeconomic implications requires consideration of the receiving environment.

6.1 The Scope and Steel Manufacturing Operation Area of Influence

The ESHIA method relies on the collection of precise and trustworthy baseline data since it serves as a benchmark against which possible consequences can be examined and monitored. The baseline studies identify the range and status of sensitive resources (physical, biological, and human), the presence of species of conservation significance and critical ecosystems, communities and residential habitats, and any potential impacts to the wider ecosystem or ecosystem services within the project area of influence. The influence can be small or large, and it can be local or regional. All receptors and resources identified as having the potential to be severely impacted by the proposed project as planned are discussed in the ideal baseline information.

6.2 Physical Environment

6.2.1 Climate and Meteorology

Due to the lack of data on the specific project site, the meteorological data reported in this publication were for the Songo - Koya region.

General

Sierra Leone's climate is generally defined as wet tropical monsoon, with a single wet and dry season per year. The Wet Season lasts from May to November, with July and August being the wettest months of the year. The remainder of the year is known as Dry Season. During the dry season, temperatures are at their highest, peaking in March and April.

Area of the Project

As this is the closest meteorological station, a summary of some climatic data for Newton (Latitude 8.33N Longitude 13.00W) has been utilized for the project area (Table 8).

Table 8: Summary of Some Climatic Data for Newton

Climatic Variable		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Mean Temperature (°C) 17- 22 yrs	Max	32.2	33.4	33.5	34.3	32.4	30.3	28.3	27.3	25.8	30.9	31.3	31.9
	Min	19.6	20.7	21.3	22.5	22.7	22.0	22.0	22.1	22.1	21.8	21.7	20.3
Average Relative Humidity (%)	9 a.m.	76.1	90.8	79.4	82.0	85.0	89.1	90.1	91.5	88.1	86.5	85.8	77.9
	3 p.m.	41.5	45.7	44.8	49.6	60.1	64.2	73.5	72.0	71.5	68.8	63.9	48.3
Monthly Means of Rainfall (mm) 21yrs		10.9	13.2	14.3	63.7	212.4	359.5	659.9	680.4	469.4	296.3	150.9	30.8

Source: UNDP/FAO- TR5, 1980

Rainfall

During the rainy season (May-October), mean monthly rainfall ranges from 212.4 mm to 680.4 mm, with very low rainfall between November and April ranging from 10.9 mm to 150.9 mm. The annual rainfall averages between 2,500 and 3000 mm. The majority of the rain falls between mid-May and mid-November, with August being the wettest month.

Temperature

The average monthly maximum temperature in the dry season is 33.5°C, whereas the average monthly maximum temperature in the rainy season is 32.4°C. In the dry season, the average monthly minimum temperature is 19.6°C, whereas in the wet season, it is 21.8°C.

Relative Humidity

At 09.00 hrs, the relative humidity level is between 76.1 and 91.5 percent, and at 1500 hrs, it's between 41.5 and 73.5 percent, with lows in January and highs in August and July.

Wind speed

On September 23, 2013, wind speeds measured with a portable anemometer vane probe in the project area and all four villages ranged from 0.2 to 0.6 m/s, with a mean of 0.3 m/s and a mode of 0.2 m/s. The recorded windspeed was considered low to moderate. This was observed at 0.3 m/s at the project site, probably because to some secondary vegetation cover.

6.2.2 Topography

There are no hills in this area, hence the landform is mostly flat. The water table is often high, resulting in wetlands and waterlogging spots in the valleys. The proposed Steel Factory is located between 71 and 90 meters above sea level.

6.2.3 Geology

Geologically, the proposed factory is located in the Bullom Group and Kasila Group (Upper). It's made up of sedimentary rocks at the bottom, which are overlain by metamorphic rocks as you get closer to the top. The amphibolites quartzo-feld spathitic hornblende garnetiferous gneisses known as the Okra Hills, some eight miles east of Songo and considered to belong to the old Pre-Cambrian Kasila Group, are the nearest known occurrence of earliest rocks (Figure 4). The then-Colony gabbro complex's north-east boundary (Dixey, 1922) is roughly 11 miles to the west.

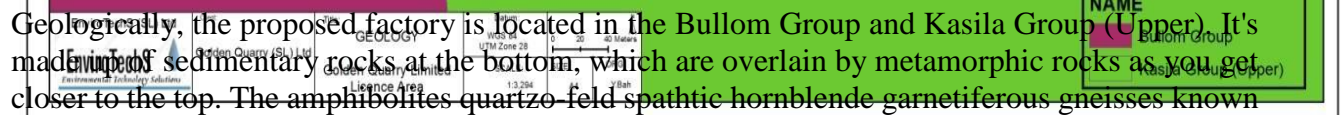


Figure 4: Geology of the project site

The hills feature an inlier of metamorphic rocks of Precambrian ages (the Kasila Group), within a younger sedimentary sequences of Cenozoic age (the Bullom Group). The Kasila Group constituting the upper reaches of the hills consists largely of Amphibolite associated with quartzofeldspathic and garnetiferous gneisses. The dominant minerals are hornblende, plagioclase, garnet, pyroxene and quartz. Later minerals are chlorite and calcite and probably formed during the later Rokelide event (about 600my before present).

6.2.4 Air Quality Monitoring

At different times and for varied durations, the quality of dust particulate matter in the air was measured at two locations in the project-affected settlement area and two locations in the proposed manufacturing area. A portable micro dust pro Aerosol monitoring equipment was used to take measurements. Table 9 summarizes the findings of the dust fall measurements.

At the time of the investigation, the result level of dust particulates in the atmosphere revealed that dust levels were generally low (0.227 – 1.669 mg/m³) in all four localities. The values are well below the globally recognised public health maximum allowable limits (10 mg/m³).

Table 9: Air Quality Levels (Dust Particulates)

Location	Date	Coordinate	Time	Duration (min)	Av. Wind Speed (ms ⁻¹)	Av. Value mg/m ³	Max Value mg/m ³
Magbentha Village Central	06/11/21	726665.12 mE 927255.77 mN	09.30 a.m.	15	1.4	0.228	0.384
Magbentha – Road to the Proposed Factory	06/11/21	726495.09 mE 927224.59 mN	10.30 a.m.	15	1.8	0.124	0.210
Proposed Production Area	06/11/21	726455.12 mE 927215.03 mN	11.30 a.m.	15	2.1	1.514	2.985
Proposed Furnance Zone	06/11/21	726555.14 mE 927235.11 mN	12.30 p.m.	18	1.9	1.667	3.182

Source: Field Measurements

6.2.5 Noise

The project area is situated in a sparsely populated area. Because to the usage of diesel equipment and mining activities such as clearing, digging, drilling, blasting, processing, and transportation, the operation will generate noise. The occasional automobile movement and residents' activities contribute to the noise in these areas. If noise is not properly managed, it can have a harmful impact on the environment and communities.

At different times of the day, noise levels were measured and recorded at two (2) places in the project community and two (2) in the concession area. The following equipment was utilized to conduct the noise study: Bruel and Kjaer Precision Integrating Sound Level Meter, Type 2230, serial number 1483775, with windscreen and Bruel and Kjaer Type 4155 Microphone, serial number 1507751. A 01dB Sound Level Calibrator Cal01, se r. Nr. 990640, was used to calibrate the equipment in the field.

Table 10: Baseline Noise Levels at the Project Area

Geographical Location		LAeq (db (A))	Measurement Date		Meteorological Data		Remarks
ID	Coordinates		Date	Hour	T (°C)	Wind Speed (Km/h)	
A1	726011mE 927180 mN	50.1	06/11/21	10:15	35.8	1.3	Magbentha Village Central
A2	728211mE 927371 mN	48.5	06/11/21	11:50	36.3	1.5	Towards the concession area
B1	726495.12 mE 927235.79 mN	47.8	06/11/21	12:45	36.2	1.8	Proposed Production Area
B2	726494.10 mE 927236.68 mN	50.5	06/11/21	13:40	35.7	1.7	Proposed Furnace Zone

Noise levels in the planned project region are similar to those seen in rural settings, according to the noise baseline study.

The baseline noise levels are relatively low, with no noticeable impacts on the local populace, due to the remote location of the planned project area, the surrounding vegetation, and the lack of economically based companies in the vicinity.

6.2.6 Soils

Review of secondary data on representative landforms/facets gathered from other studies was employed in this study's methodology. In general, the project area's soils are highly gravelly ferralitics soils with shallow spoils on moderate to high relief hills created by and ultrabasic rocks (see figure 5). They are usually unsuited for agriculture due to their shallow soils to laterite sheet. Based primarily on their textures, three (3) soil types have been identified in the project area:

1. The soils are moderately deep to shallow, with texture ranging from gravelly sandy loam to gravelly sandy clay loam in the topsoil and very gravelly sandy clay in the subsoil. Compacted gravels or bedrock lie beneath them, limiting auguring to depths of 20 to 50 cm. They are well drained, with a water table below the augured depth; the soil is dusky red to dark red in color; and the typical topsoil depth is about 5cm due to stripping.
2. Sandy loam over sandy clay loam with a lot of gravel. They're mostly gravelly throughout the profile, with a small layer of gravel-free topsoil in the middle. The soils range in depth from moderate to shallow. In the topsoil, the texture goes from sandy loam to gravelly sandy loam, while in the subsoil, the texture ranges from very gravelly sandy clay loam to very gravelly sandy clay loam. Because these soils are underlain by compacted gravels or bedrock, auguring is limited to 30 centimeters. They are well-drained, with a dark brown to dark red soil color. The average depth of topsoil is roughly 10cm.

3. Gravelly sandy loam over very gravelly sandy clay, with soil depths ranging from moderate to shallow. In the topsoil, the texture goes from sandy loam to gravelly sandy loam, while in the subsoil, the texture ranges from very gravelly sandy clay loam to very gravelly sandy clay loam. These well-drained soils are underlain by compacted gravels or bedrock. Soils range in color from dark brown to dark crimson. The average depth of topsoil is roughly 10cm.

6.2.7 Hydrology

Because the project area is 1.5 kilometers from the nearest water source, there will be no direct impact on the water quality in the area.

Surface Water

Seasonal streams and springs that generally dry up during the dry season are about 1 km away from the project area, according to field observations (see figure 5). However, some of the project's catchment areas spilled into these seasonal streams.

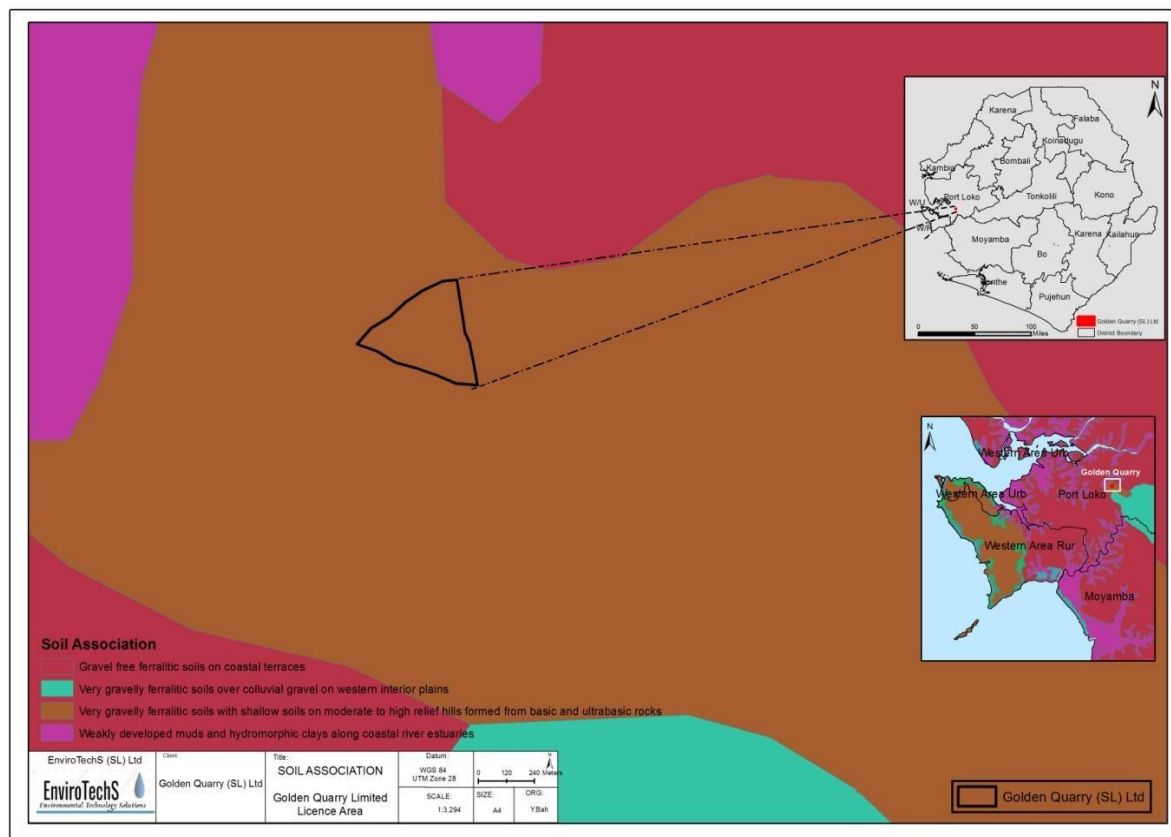


Figure 5: Soil association of the site

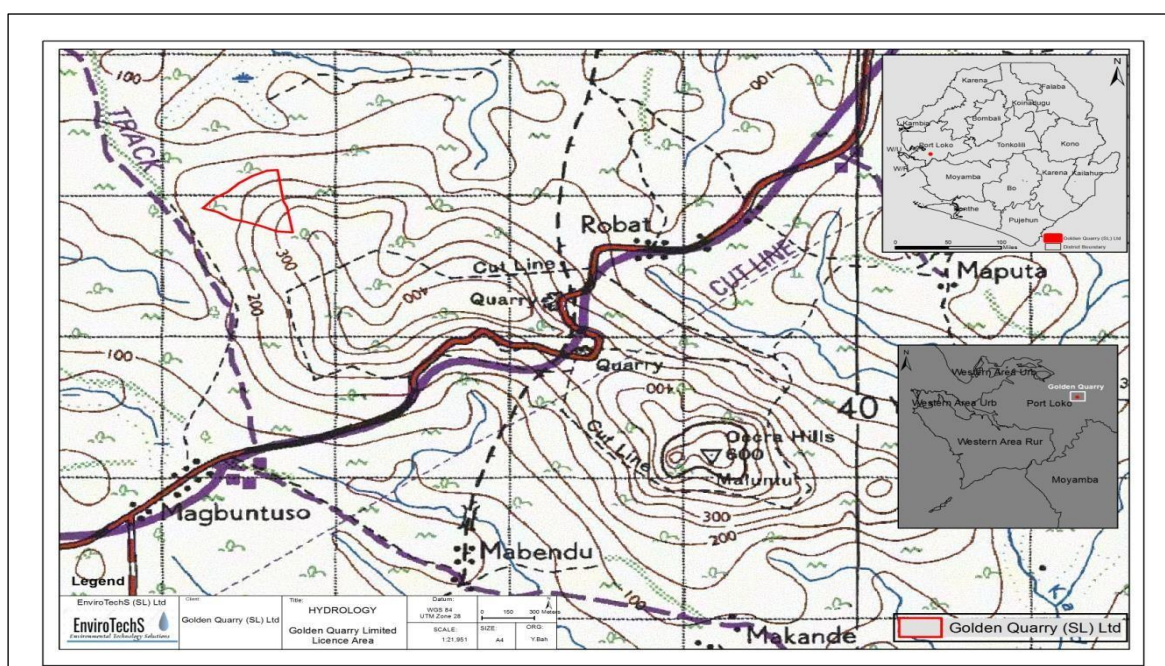


Figure 6: Surface water flows and topography in the project location and surrounding

Surface and Ground Water Quality

Sample collection was used to determine the baseline features of surface and ground water quality, including physical, chemical, and microbiological parameters.

Sample Collection Methodology

Plastic containers were used to collect samples, which were rinsed clean and boiled before being labelled according to the location of the collecting stations. This was done to keep the sample from becoming contaminated. Before the actual sample was collected and tightly closed before being delivered to the laboratory for examination, the plastic bottle was rinsed three times with the sample to be collected. Samples were transferred to the laboratory as soon as feasible after collection, and samples were maintained in a cooler with ice packs to resemble the conditions under which they were obtained, depending on the analytical needs.

Table 10: Baseline Water Quality Result in the Project Area

Parameters		Stream - Main Domestic /Drinking Water Source	Bore Hole
Physical	Conductivity	36.3	52.5
	TDS	11.7	8.4
	pH	7.0	7.2
	Temperature	25.1	26.2
	Turbidity	0.1	0.97

Chemicals	Iron	0.04	0.04
	Sulphate	1	2
	Nitrate	2	2
	Nitrite	0.01	0.01
	Chromium	0.034	0.031
	Phosphate	0.02	0.04
	Chloride	3	2
	Copper	0.06	0.06
	Arsenic	0.00	0.00
Bacteriological	Faecal	6	Nil
	Non-faecal	09	Nil

pH

All of the water sample locations have a pH between 7.0 and 7.2. These numbers fall within the World Health Organization's permitted range of 6.5 to 8.5.

Turbidity

As a result, turbidity is a metric for water clarity. The turbidity in both sample points is less than 5 NTU. Suspended particles in water, such as clay, silt, organic and inorganic materials, plankton, and other microorganisms, create turbidity. Although turbidity has no direct impact on human health, it does diminish the efficacy of water disinfection. Suspended particles can protect microorganisms from disinfectants. Users may reject a water supply due to its turbidity for solely aesthetic reasons. According to the WHO, turbidity in water can be recognized by the naked eye when it exceeds 5 NTU.

Electrical Conductivity

Both water sources have electrical conductivity (EC) of 36.3 S/cm and 52.5 S/cm, respectively. This is far within the WHO's suggested palatable water level of 850 S/cm.

Temperature

Water temperatures are **25.1°C** and **26.2°C**.

Faecal coliforms

The major water source included faecal coliforms. Faecal coliforms are bacteria found in the intestine, and their presence in any water source indicates faecal contamination, even if salmonella Sp. germs, which are linked to typhoid illness, were not found in the water samples. As a result,

drinking water from these contaminated sources is dangerous to one's health. According to the WHO, no faecal indicator bacteria should be present in any drinking water.

Dissolved Chemicals ions

In most cases, the concentrations of dissolved chemical ions in the water samples were negligible and within the World Health Organization's acceptable limits.

Iron

Natural waters include iron in the ferrous or soluble state, which is quickly oxidized to ferric. Iron in home water supplies stains clothes and gives water a harsh taste, posing a nuisance rather than a health risk. This can cause users to reject a water source. According to the WHO, the taste threshold for iron in water is 0.3 mg/l.

Nitrate

The concentrations of nitrate- were below the WHO's suggested threshold limit of 10 mg/l. Methaemoglobinaemia (blue-babies) can be caused by high levels of nitrate in any water source, especially in neonates. Nitrate causes haemoglobin to oxidize, rendering it incapable of transporting oxygen to the tissues, resulting in asphyxiation and death.

Conclusion

All water sampling stations have temperatures, pH, electrical conductivity values, and dissolved compounds that are within WHO recommended thresholds. This survey revealed that the people's major home water source has bacteriological pollution, necessitating a comprehensive treatment process to make it safe for human consumption.

6.3 Biological Environment

The biodiversity of a region has a significant impact on its environmental stability. A more complex ecosystem with a range of food webs and biotic interactions is likely to be found in areas with high levels of species and genetic diversity. Because the ecosystem has more methods to respond to a disturbance and solve issues as it becomes more complex, it is more likely to recover to a stable state following a disturbance.

A vegetation survey was conducted in the Dura Plast (SL) Limited concession area in Magbentha Village in the Koya Chieftdom, Port Loko District. This region will be used for the production of steel. The data in this report was gathered over the course of four (4) days in October of 2021.

The following is a summary of the survey's scope:

- Determine the area's taxonomic diversity (total species richness and abundance) as well as the factors that influence the species composition.
- Determine the size and health of the ecosystem (such as land cover and land use)

Site description

Before Magbonthoso Town, on the way to Masiaka, the concession area is located south of the main highway. A low-lying rugged land with regenerated farm bush and palm trees is one of the key attractions. At the site's end, a tiny brook runs through it, with vegetation on both sides consisting of a few large trees. The location is flat and muddy, with a variety of grass species and only a few trees, and it floods during the rainy season.

6.3.1 Flora

Plant survey design and methods

The survey was based on line transects that were each 100 meters long and 10 meters apart. The overall length of all transects was 1060m, which was split up into 11 transects. Few transects came to a halt at the road's edge, resulting in a handful of transects with lengths of less than 100 meters. After every 10 meters along each transect, sampling sites were placed on opposite sides of the transect. In addition, a walk-in survey was done to describe species composition and assess habitat integrity in the region. Various regional floras were used to identify the plant specimens. Unidentified specimens were brought to Njala University's National Herbarium for appropriate identification and matching.

Result

A year-old abandoned farm, regenerating farm bushes, and thicket at various phases of growth defined by the gradation in height of the plant communities are all prevalent elements of the concession area. Ten trees with DBH 10cm were discovered at the top of the slope with short boles, poor crown and trunk conditions, and loose tree canopies. When the ground was cleared for farming, these forest trees were left standing in a random pattern. The biological species richness in the lowland was higher than at the summit of the hill, which has a very high disturbance index. However, as coppices of tree stumps and young seedlings of secondary forest, there is an abundance of oil palm *Elaeis guineensis*, herbaceous weeds, and suffrutescens as well as herbaceous weeds and suffrutescens. *Carapa procera*, *Sterculia tragacantha*, *Albizia zygia*, *Phyllanthus discoides*, *Pentadesma butyracea*, *Dialium guineensis*, *Musanga cercrepoides*, *Melecia regia*, *Alchornea cordifolia*, and *Craterispermum laurinum* were the most prevalent plant species stumps found. Although there is no intact forest, there is a relic of forest trees on the banks of a tiny creek with traces of species composition and community structure change. *Alchornea cordifolia*, *Ageratum conyzoides*, *Solanum torvum*, *Combretum grandiflorum*, and *Selaginella myosorus* were common climbing herbs and scrambling shrubs in well-managed farm bushes.

Medium-height savanna tree species with luxuriant grass cover dominate the plant communities at the Camp Site's low-lying sections, which are generally dominated by a patchwork of grass species such as Lalang grass *Imperata cylindrica* var *africana* and *Pennisetum purpureum*. Weedy secondary forest herbs like *Zonnia latifolia*, *Aspilla latifolia*, and *Dissotis* spp. were also found. Man has altered this area through farming and fire regimes.

6.3.2 Fauna

Field observations, the administration of the checklist, and information collected from field guides who are Magbentha community natives were used to identify the animals.

Result

There is dense vegetation near the studied project concession area that might provide substantial and diverse habitat for a wide range of animals, but not in the concession area, which is extensively disturbed.

Rodents such as Squirrels, Cane rats, Giant rats, Snakes, Grass cutters, and Porcupines were among the few animal species discovered. The absence of primates in the area is due to a lack of trees that may provide food for them.

Weaver birds are always found breeding on palm trees, wild Pigeons, wild Chickens are often seen

in the grassland or regrowth vegetation, Hawks, Bee eaters, and Secretary birds are all visible.

6.3.3 Land Use

Annual crops were cultivated using ancient instruments like as hoes, shovels, and cutlasses to chop and burn the plants in a rotating cropping pattern. The length of a fallow period varies from one to two years. The extent to which the vegetation in the area is covered demonstrates this. Hunting is visible, but it is limited to trapping. In the concession area, there is evidence of firewood collecting and charcoal manufacture.

6.4 Socioeconomic Status and Living Conditions

This section gives a general overview of the socioeconomic conditions in the factory's operation region and its environs. The goal of this survey is to gather information about the study area's primary stakeholders and to examine public perceptions, interests, and objections to the current living conditions of residents in the targeted settlement.

6.4.1 Demographic and Population Structure

Port Loko District has a population of 615,376 people, according to the preliminary results of Statistics Sierra Leone's recent population and housing census (SSL, PHC-2015). The population of the Koya Chiefdom is 85,177 people. This includes 40,119 males, who account for 47.1 percent of the population, and 45,058 females, who account for 52.9 percent. The rural population of Koya Chiefdom is 76,861 people, accounting for 90.20 percent of the total population, while the urban population is 8,326 people, accounting for 9.80 percent. The research area has a somewhat larger proportion of females than males. The rise in the birth rate, as well as the immigration of people engaged in diverse industries such as farming and petty trading, have had a significant impact on the population size. Because of its proximity to the capital city and its location on a major highway, Magbonthoso also functions as a business hub. With the availability of work possibilities, trade, and farming activities in the surrounding communities of Masiaka, it is expected that the population of this area will swiftly grow.

6.4.2 Ethnicity and Religion

Sierra Leone has two major religions: Islam and Christianity, with a tiny percentage of the population practicing traditional religion. More than half of the residents (95%) are Muslims, while 4% are Christians, and the remaining 1% either observe traditional religion or are atheists. Although the country contains 18 ethnic groupings, the Temne and Limba tribes are the most prevalent in the research localities or project area. More than 95 percent of the ethnic distribution in the area is made up of these ethnic groupings. Loko, Madingo, or Fullah make up the rest.

6.4.3 Local authorities and administration

A Paramount Chief, Councillor, Town Chief, Head Men, Section Chiefs, and other officials control the Koya Chiefdom. Whose power is enshrined in the revised Local Government Act of 2004? The communities' day-to-day governance is strictly hierarchical, with these authorities in charge. Higher authorities outside of these localities will be consulted in cases of major civil concerns.

Each of these (Settlements) villages also has a Village Development Committee, a Women's Committee, and a Youth Committee, all of which are led by a chairman (leader) and supported by a deputy and/or a secretary.

6.4.4 Education and Literacy

Sierra Leone's literacy and education levels are generally low. In the project area, the education sector faces a number of limits and problems. These are some of them:

- A scarcity of trained and qualified instructors; • deteriorating school structures and a lack of classrooms;
- overcrowding in classrooms due to insufficient infrastructure;
- In the neighborhood under investigation, there is a chronic shortage of teaching and learning tools;
- High school dropout rates in public examinations

However, the gender gap in literacy is narrowing, thanks to government measures such as free tuition and books to encourage more female students to attend school.

6.4.5 Infrastructure and standard of living

Of general, the infrastructure and living quality in the Port Loko District are poor. The Port Loko District is primarily rural, with a city and semi-urban communities like as Lungi, Lunsar, Masiaka, and others. Substandard dwellings made of mud or wood with grass and thatch covering make up a large number of the houses in the Villages, while concrete houses covered in corrugated iron sheets make up a small proportion (about 30%). Some communities in the District, particularly those near the highway, have a number of conventional modern structures such as office apartments, administrative buildings, community centers, and court barracks.

6.4.6 Sources of energy

The government has recently made significant efforts to restore energy in the Port Loko District. Through the Bankasoka Hydroelectric Project and thermal power plants in Lungi, this endeavor has been observed to light up Port Loko City and its vicinity. The majority of households cook with wood as their primary source of energy. In the Port Loko District, just a small percentage of the population has access to power. Kerosene, gas, and charcoal are some of the other energy sources. In this District, batteries or solar lights are used as the primary source of lighting by around 97.0 percent of households.

6.4.7 Health and sanitation

At birth, life expectancy is 47.9 years, and infant mortality rates are 118 per 1,000. (although low, both figures are better and shows great improvement). 61.1 percent of homes in the United States have access to improved (uncontaminated) water sources such as a protected dug well, a spring, or rainwater. In Port Loko, most households do not have access to better water.

Due to high fertility rates of (5.1) children per woman, work-related stress, exceptionally high maternal death rates, and insufficient food nutrition availability, the country's health status is quite bad. The plight of women in Port Loko District is similar to that of women around the country.

The Free Health Care Medical Initiative, funded by the United Nations Fund for Population Activities (UNFPA), the World Bank, and the Department for International Development, is an innovative strategy used by the Government of Sierra Leone for pregnant and breast-feeding women and children under the age of five. Furthermore, a number of development partners and agencies have renovated and rebuilt health centers, given medical equipment, and the staffs of various PHU are involved in a continual training program backed by the government and its partners. As a result, the District's health situation has vastly improved. While this is happening, the top six; Malaria, water and faecal-borne diseases, sexually transmitted infections, skin infections, and respiratory tract infections are the conditions linked to morbidity.

Adolescent and youth reproductive health continues to be a major public health issue. Forcible marriages, as well as a lack of information and youth-friendly reproductive health care, are also contributing causes. High rates of sexual debut, adolescent pregnancy, school dropouts, and the resulting lack of education are all indications of this health issue for girls. Malaria, fever, general

pains or diseases, post-natal sickness, STIs, diarrhea, skin infestations, pneumonia, and other illnesses are all treated differently by the populations of the three chiefdoms.

Only 12.4% of households in the United States have upgraded toilet facilities (Statistics Sierra Leone, 2006). The majority of people do not have access to improved facilities and must rely on a bush, stream, or other public space.

6.4.8 Land ownership and rights

In this location, traditional land tenure regulations prevail. Land ownership is vested in chiefdoms, villages, and communities under customary law, and it can never be acquired freehold. Under customary law, land always belongs to the community under various forms of tenure. The Chiefdom Councils Act, as well as Section 28 (d) of the Local Government Act of 1994, establish this principle (Ajei, 2008).

The customary land tenure system in the project area is based on family and community tenure, which is based on lineage or clan and connects all descendants of a single ancestor or group of ancestors who are regarded as the family or clan's founders. Family units like this are legal entities with the ability to claim and possess land. The family as a whole holds the most important claim to the land. The family land is managed by a head of family, who is assisted by a council made up of the family's most important members. Although the family owns the land, other family groupings may have varying degrees of smaller interests in specific areas of the land.

Despite the fact that the area is dominated by family land tenure, it is widely understood that the Head Man is the custodian of the land on behalf of the entire village, and that he arbitrates land disputes. Local landowners consider their property to be a valuable asset. It is their only source of safety in an otherwise dangerous economic situation. Land is seen as a safety net for people's livelihoods. The vast majority of individuals have access to more than 4 hectares of land, and most households have more land than they can cultivate.

6.4.9 Livelihood and employment

Agriculture continues to be the primary sector of the economy, employing up to 75 percent of the people. However, overall food production yields are often low (cassava, sweet potatoes). Upland boliland (seasonal wetlands), riverine grassland, inland valley, and mangrove swamps are the five main ecologies where rice is farmed. Cassava is grown in inland valley wetlands and upland areas. The cattle industry is still a tiny and underdeveloped one.

Artisanal quarrying, charcoal burning, fishing, tailoring, carpentry, weaving, blacksmithing, and gara tie-dye are some of the other non-farm livelihood/income generating activities in the Port Loko District.

6.4.10 Transport and communication

The largest hamlet in the project area, Magbonthoso, is located on the main Freetown – Masiaka Highway (now the Wellington- Masiaka Toll Road). This road has improved trade and movement of numerous agricultural products while also reducing traffic congestion. The Wellington-Masiaka toll road has also given the surrounding area a considerable renovation, which will have an unintended impact on urbanization. Feeder roads and other road networks connecting several communities in the project area, on the other hand, remain unpaved and in bad condition. Thus, impacting the lives and livelihood of these communities adversely. Because of this, the modes of transportation are very limited during the wet season. Notwithstanding these concerns, it is worth noting that these unpaved roads are large enough for all types of vehicles to ply, ranging from mini-bus, haulage trucks, SUVs and motorcycle. The motorcycles (“okada”) are used on trunk roads.

The introduction of cell phones has improved communication in the area.

6.4.11 Archaeology and Cultural heritage

Cultural activities may be found in nearly every region of the Port Loko District, with societal shrines, holy forests, and other hidden cultural traditions being more common in villages and smaller settlements. These locations are usually well-protected and well-maintained for the purpose. These spiritual shrines, trees, and woodlands, among other things, are meticulously preserved and passed down from generation to generation. The following are some of the traditional or secret society practices found in the project area:

- Ojeh
- Manekeh
- Poro society
- Bondo society among the female folk.

The lifestyles and civilisation of these communities are dominated by secret organizations.

The village community's ancestral graves or burial grounds, as well as shrine bushes where other local sacrifices and traditional ceremonies are performed, were discovered. Regarding the project site's cultural heritage, it should be mentioned that the project site poses no problems in terms of historical and cultural values. When such a threat exists, communities believe that some ancient procedures, such as the pouring of libation, must be observed, as well as proper recompense, before the site is transferred or cleared for a non-cultural or traditional purpose.

6.4.12 Vulnerable Groups

Widows of all ages, particularly senior widows, elderly couples with both spouses who are older and do not have the aid of their children, disabled, crippled, and blind persons were recognized as vulnerable categories in the project region.

7.0 ANTICIPATED IMPACTS TO BE ADDRESSED AND MITIGATION MEASURES

This section discusses the project's possible socio-economic, health, and environmental implications, which will be investigated as part of the environmental impact assessment process. It also explains the methodology used in the Impact Assessment research to determine the magnitude of the impact and the relevant mitigating steps to adopt. During the EIA study, the following aspects are evaluated:

1. Biophysical:
 - Geology, Soils, land capability and land use
 - Biodiversity (fauna, and flora)
 - Aquatic ecology and ecosystems
 - Surface water
 - Groundwater
 - Wetlands
 - Air Quality
 - Noise
2. Cultural heritage
3. Visual environment
4. Socio-economic
5. Traffic and safety
6. Occupational health and safety
7. Closure and Rehabilitation

The final impact table will include proposed mitigation measures, a post-mitigation significance assessment, and monitoring and inspection details that must be implemented to reduce the probability or severity of the impact and ensure mitigation measures are appropriate, as well as additional impacts identified by project interested and affected parties (I&APs) and by specialists.

All issues or potential impacts that was discovered by the I&APs has been added to the list of potential impacts through the public participation procedure (PPP).

7.1 Proposed Impacts Assessment Methodology

Impact assessment methodologies were created to:

- 1) identify potential effects of a planned development on the social and natural environment;
- 2) forecast the likelihood of these impacts; and
- 3) assess the significance of the prospective impacts.

The following is the methodology that was utilized to assess the above-mentioned impacts:

Table 11: Environmental Impacts Assessment Methodology

Status of the impact		
Status	Description	
Positive:	a benefit to the holistic environment	
Negative:	a cost to the holistic environment	
Neutral:	no cost or benefit	
The magnitude (severe or beneficial) of the impact		
Score	Severe/beneficial effect	Description
1	Slight	Little effect – negligible disturbance/benefit
2	Slight to moderate	Effects observable – environmental impacts reversible with time
3	Moderate	Effects observable – impacts reversible with rehabilitation
4	Moderate to high	Extensive effects – irreversible alteration to the environment
5	High	Extensive permanent effects with irreversible alteration
The extent of the impact		
Score	Extend	Description
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world
Duration of the impact		
Score	Duration	Description
1	Short term	Less than 2 years
2	Short to medium term	2 – 5 years
3	Medium term	6 – 25 years
4	Long term	26 – 45 years
5	Permanent	46 years or more
The reversibility of the impact		
Score	Reversibility	Description
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
The Consequence = Magnitude + Spatial Scale + Duration + Reversibility.		
The probability of the impact		
Score	Probability	Description
1	Unlikely	Less than 15% sure of an impact occurring
2	Possible/likely	Between 15% and 40% sure of an impact occurring
3	Probable	Between 40% and 60% sure that the impact will occur
4	Highly Probable	Between 60% and 85% sure that the impact will occur
5	Definite	Over 85% sure that the impact will occur
The Significance = Consequence x Probability.		
Score out of 100		Significant
1 to 20		Low
21 to 40		Moderate to low
41 to 60		Moderate
61 to 80		Moderate to High
81 to 100		High
Is mitigation possible?		Yes or no?

7.2 Potential Negative and Adverse Impacts of the Project

Dura Plast (SL) Limited contracted CERQM to perform a comprehensive study and assessment of the potential and negative environmental impacts of its steel-making operations and closure reclamation work in Magbentha Village, Port Loko District. During project site visits and field activities in September, October, and November 2021, CERQM specialists became familiar with environmental baseline conditions, such as the quarry site, the degree of present environmental contamination, and the environmental monitoring program to be implemented.

In the process of analyzing potential negative and adverse impacts from project activities, Sierra Leone's Environmental Protection Agency Act, 2008 EIA guidelines, checklist, and screening form developed by EPA-SL, and the World Bank Group's Environmental and Social Safety Framework (ESSF) were used.

Prior to project commissioning, a checklist that assesses project impact type, scale, severity, and duration on such aspects as site specific, local and regional environment and ecology, socio-economic and demographic features, as well as human health, was developed to correctly identify potential environmental impacts of any steel manufacturing operations. These factors have been spelled out in the World Bank Group's recommendations.

Table 12: Potential Environmental Impacts of Mining Operations and Decommissioning

Environmental indicators	Direct impact	Indirect impact	Short term	Medium term	Long term	Reversible	Non-reversible	Severity- high	Severity-medium	Severity negligible
Changes to ground water flow										
Changes to surface water flow										
Changes to vegetation cover										
Soil erosion										
Changes to local geology										
Impact on wildlife habitats										
Changes to the climate										
Underground resources										
Pasteur land										
Raw material resources										
Deterioration of ground water quality										
Deterioration of surface water quality										

Environmental indicators	Direct impact	Indirect impact	Short term	Medium term	Long term	Reversible	Non-reversible	Severity- high	Severity-medium	Severity negligible
Air pollution										
Soil pollution										
Hazardous and toxic materials spilled to soil										
Impact of noise and vibration										
Changes to visual aesthetics of nature										
Impact on landscape and its features										
Impact on specially protected areas/lands										
Impact on places of historical and cultural value										
Impact on archeological findings in project area										
Changes to private ownership and tax income										
Contribution to the Gross Domestic Product (GDP)										
Poverty reduction										
Increase employment opportunities										
Increase in seasonal employment and income										
Impact on public health										
Impact on soil and landform during decommissioning										
Wedge and pit wall failure										
Windstorm, fire, thunderbolt, etc.										
Total	19	3	2	8	12	8	14	4	7	11

Steel manufacturing operations in the project area have been assessed as having 22 effects. Based on the nature, length, and severity of the impact on the natural environment and socioeconomic situations, the following conclusion can be drawn: out of 19 direct impacts, 3 have a positive socioeconomic impact, and the rest have a negative impact.

Direct impacts: 19 impacts are anticipated to have direct impact, including: heavy machinery and vehicle movement, resulting in noise, toxic gas emissions into the air, odour, impact on wildlife species and habitat shrinkage, and impact on soil quality due to disturbances within the steel manufacturing site and its surroundings, including roads, are expected to generate dust, pollute the soil, and cause

climate change. Other expected emergencies and natural disasters (windstorms, fires, and so on) are categorized as indirect impacts.

Soil stripping and hauling, as well as surface soil stockpiling, will have a direct impact on local geology, landform, and landscape changes, producing soil erosion and quality degradation. Pastureland will be unfitted for animals consumption. There will be no negative effects on subterranean resources such as ground water quality or flow. Other effects include resource depletion and consumption, increased dust and noise from steel manufacturing processes, and an aesthetic influence on the environment and its features.

Furthermore, a spill of oils and fuels is expected to have a negative influence on the soil, surface water, and groundwater quality. The aforementioned effects will have an impact on local communities' and employees' public health. Employment prospects, increased fiscal income, contribution to the gross domestic product, and tax payment benefits are all expected to be positive outcomes.

Indirect impact: Heavy machinery movement causing noise, harmful gas emissions into the air, odour impact, and soil quality impact owing to disturbances within the industrial land and its surrounds, including the roadways, are expected to generate dust, cause soil pollution, and climate change. Other emergency circumstances and natural disasters (windstorms, fires, and so on) are considered indirect impacts.

Impact duration: The vast majority of the anticipated impacts – 12 – will have a long-term impact, two (2) will have a short-term impact, and eight (8) will have a medium-term impact. The steel production operation is planned to last 30 to 50 years or longer, implying that changes in nature and ecosystems, natural resource consumption, environmental quality, and anticipated repercussions on the national, regional, and local economies would have long-term consequences.

Impact reversibility: There are two types of potential impacts: negative and positive, as well as reversible and irreversible. Irreversible effects include: projected changes in the usage of iron ore reserves throughout industrial processes, soil quality in the project region, flora and plant cover, surface water quality and flow, air quality changes owing to produced dust, and gases released from vehicle exhausts. These environmental factors will have an irreversible negative impact on the attractiveness of the landscape and its features.

Noise from machinery and equipment operations, fuel spills polluting soil and water, and impacts from improper domestic waste handling and immediate disposal, as well as impacts from environmental incidents and natural disasters, are expected to have reversible effects on manufacturing operations and environmental quality for human and public health.

Impact severity: As shown in table 12, 50.0 percent of all impacts are likely to have a high severity impact, 32.0 percent will have a medium severity impact, and 18.0 percent will have a low severity impact.

- Because smelting will take place, there are likely to be severe consequences.
- However, increasing municipal fiscal income, private ownership, and corporation tax payments are likely to have a favourable economic impact.

- Medium-severity impacts include soil erosion and quality deterioration, changes to the vegetation cover structure, and a medium-term visual impact on the aesthetics of the project's local landscape owing to factory building. In addition, site discharges are predicted to have a medium-term influence on ground and surface water quality. The intensity of the remaining four consequences is predicted to be minor.

7.3 Mitigation Measures

Mitigation measures try to avoid negative consequences from occurring and to keep those that do occur to a manageable level. The goals of mitigation are to improve the project's environmental and social advantages, to avoid, minimize, abate, repair, or compensate for negative impacts, and to keep any residual negative impacts to tolerable levels. The recommended mitigation methods are thoroughly detailed in the impact assessment, allowing the clearest analysis of the remaining or residual consequences to be given below.

Dura Plast (SL) Limited steel manufacturing project environmental impact was assessed based on project location, technology/equipment selection, and environmental concerns during project implementation, and a "occurrence likelihood" (by the potential impact) list was developed based on impact consequence. For each category, "negative," "neutral," and "positive" impacts were checked, if applicable. Table 13 shows the results of the impact identification and likelihood of occurrence evaluation.

Table 13: Consequences of environmental impacts and mitigation measures

Environmental concerns	No impact	consequences			Mitigation measure(s)
		Negative	Neutral	Positive	
Potential environmental concerns related to project location					
Issues relating to local community and livestock					Fence concession area and organise awareness programmes
Historical, cultural and archaeological features					
Changes to water supply and groundwater regime			X		
Changes to water regime of springs and streams, causing dry up and disappearance					
Potential environmental concerns from project construction phase					
Vegetation removal and tree cutting					Revegetation after closure Tree planting
Air quality (dust generation & exhaust emissions)					regular maintenance of machinery/vehicle

					dust suppression by watering
Environmental noise			X		Notify community before furnace start up and to be conducted during the day
Occupational noise (machinery movement)					Provide ear muffs, Staff rotation, Regular machinery maintenance
Occupational safety and health (injuries & accidents)					Use appropriate PPEs Conduct safety awareness/trainings
Potential environmental concerns during the project operational phase					
Vegetation removal					Revegetation
Soil quality (excavation, fuel/oil spillage)					Land rehabilitation Provide proper storage facility Mop and scoop for treatment
Air quality (dust generation & exhaust emissions)					Regular maintenance of machinery/vehicles, Institute effective monitoring, Wetting at least twice a day
Waste generation (domestic, scrap metals & sewage)					Segregate solid waste Demarcate confinement for scrap metals Construct pit toilet to avoid open defecation
Environmental noise			X		Notify community before furnace start up and to be conducted during the day
Occupational noise (machinery movement)					Provide ear muffs Staff rotation Regular machinery maintenance
Occupational safety and health (injuries & accidents)					Use appropriate PPEs Conduct safety awareness/trainings First aid tool box Medical provisions
Potential socio-economic concerns					
Changes to private ownership and tax income					
Contribution to the Gross Domestic Product (GDP)					
Poverty reduction			X		Priority will be given to Magbentha community

Increase employment opportunities			X		Priority will be given to Magbentha community
Increase in seasonal employment and income			X		Priority will be given to Magbentha community
Public health					

Impacts from project location: The steel production factory will be built in a location that will have minimal impact on the surrounding neighborhood. Furthermore, the construction of overburden material stockpiles and the usage of haul roads would undoubtedly generate dust, necessitating the employment of dust-reduction techniques such as soaking on a regular basis, particularly during the dry season. Because the stream is usually charged by precipitation, improper waste disposal can pollute the soil, which can have an impact on surface water quality. As a result, petroleum products and other wastes should not be thrown in the surrounding region. Any vegetation that has been removed or that has been hacked down with a stick must be replaced by planting trees. There will be no springs or streams drying up. Nonetheless, the intensity of the damage from these activities is projected to be lower.

Environmental issues from construction and processing safety: During the building phase, the following operations are expected to have an influence on the environment:

- Construction of a site camp, production facility, and/or staff housing and/or office
- Site vegetation clearing and topsoil stripping

Construction of the machinery maintenance shop, administrative area, and personnel camp will have no substantial impact on surface or ground water resources. Once these amenities are in place, however, human and vehicular traffic will undoubtedly promote tree and vegetation cover clearance in the surrounding area. The process of tree planting and revegetation will begin. Dust generation is also expected and will be minimized as previously stated. Appropriate personal protective equipment (PPEs) must be obtained and policies must be followed.

Environmental concerns during project operational phase: It's worth noting that the Environmental and Social Management Plan (ESMP) includes parts on mine operations quality and budget planning, as well as sections on safe work production and workplace safety. As a result, it is advised that the ESMP include more information in its annual quarry plans about employee work-related disease prevention and continuous improvement plans for employee health and safety, as well as accident prevention.

7.4 Generic Recommendations for Reducing Impacts from Construction and Operational Phases

- Spray water onto probable sources of particulate matter (PM) during dry periods to reduce dust;
- Within the community, a 20 km/hr speed limit should be implemented to reduce dust creation;
- The usage of dust masks should be mandated in order to protect workers' health;
- Ensure that all equipment is in good operating order;

- It is proposed that while vehicles/machinery are not in use within the operational area, engines be turned off to keep pollution levels under control;
- Check that any high-noise-generating equipment is correctly equipped with mufflers and is in good operating order;
- Construction and operating operations, including the arrival of raw materials, should be scheduled between 7 a.m. and 1 p.m. Extended working hours, on the other hand, shall be permitted by EPA-SL after submission of supporting noise monitoring results and/or engagement with the affected neighbourhood. When operating hours are prolonged (beyond those listed above), a noise level of no more than 5dB over the normal ambient noise level should be reached during those hours;
- Ensure that all personnel are appropriately protected with personal protective equipment (PPEs);
- To avoid corrugation, which contributes to truck noise, access tracks and haul roads should be adequately maintained;
- When personnel are at work, hearing protection should be worn, especially if they are near production equipment or power plants;
- If access is only needed temporarily, keep clearing to a minimum and flatten rather than remove vegetation;
- Vegetation clearing should be limited to the bare minimum required for efficient operations;
- Vegetation removal should only be done when it is absolutely necessary;
- Large trees and vegetative cover should be preserved as much as possible for their ecological significance and function;
- Roads should be kept as narrow as feasible, in accordance with applicable design and safety regulations;
- Carry out proper conservation and preservation of stripped topsoils in order to preserve their physical and chemical properties for future rehabilitation actions;
- Avoid stripping topsoil when it is saturated, since this will increase soil structure damage;
- During rehabilitation activities, avoid introducing invasive species;
- Drainage works should follow natural drainage patterns and use natural drainage lines with retained vegetation if practicable;
- Access roads and tracks have a significant impact on water quality. Gradients will be regulated, table drains will be adequately maintained, and cross drains or culverts will be erected on a regular basis;
- To prevent turbidity in streams, any runoff from working areas that contains sediments should be collected in settling ponds before being discharged.

8.0 ENVIRONMENTAL MANAGEMENT PLANS (EMP)

A project's Environmental Management Plan is made up of a number of operational plans that organize and coordinate mitigation, rehabilitation, and monitoring procedures in order to guide the project's execution and operation. Their main goal is to present the implementation of mitigation measures that will help to reduce the severity of the negative impacts identified in the impact assessment, maximize the positive impacts, and prevent the occurrence of potential negative impacts using an identification, prediction, and assessment method. Environmental management shall be thoroughly integrated into the entire project management effort at all levels of project operations in order to be effective. The project's goal will be to provide a high level of environmental protection by constructing a well-designed and constructed plan of operations that will run smoothly for the duration of its existence. The ESMP's main goals are as follows:

1. to ensure that the project is developed, executed, and decommissioned in accordance with Sierra Leone's applicable laws, regulations, and policies;
2. to minimize environmental degradation that may result from project activities;
3. to fully implement mitigation measures for every anticipated environmental and social impact;
4. to ensure that the project is developed, executed, and decommissioned in accordance with Sierra Leone's applicable laws, regulations, and policies.
5. ensuring that project activities are carried out in accordance with best practices or in a way that is internationally acceptable.
6. to determine the key personnel's roles and responsibilities;
7. to identify the roles and obligations of the key persons engaged;
8. to preserve the health and safety of the people who reside in and around the project corridor
9. to calculate the ESMP's implementation costs;
10. to suggest compliance monitoring mechanisms;
11. to prevent or decrease the occurrence and severity of injury caused by working in or with heavy machinery, in hazardous situations, or with hazardous reagents to a reasonable minimum;
12. to safeguard workers against hazards or risks to their health and safety as a result of exposure to project facilities. This could be accomplished by incorporating safe work practices into the design process, as well as administrative and industrial control mechanisms. Job rotation, training in safe work methods, workplace monitoring, restricting exposure or work time, and so on are examples of these; and
13. to help and promote better management of occupational health issues in and around the workplace in order to improve public safety and environmental protection.

8.1. Responsibilities and Obligations

8.1.1 Definition of Responsibilities and obligations:

a) Management/Supervisors are responsible to:

- follow policies and assure adherence to the EPA-SL Act, 2008, as amended in 2010, and regulations in the workplaces they supervise;
- incorporate best management practices into project operations and hold employees accountable for following best practices in performance reviews;
- give staff with information and training to ensure that proper environmental practices are followed;
- oversee personnel and audit work processes to ensure that staff are working in an ecologically responsible manner;
- evaluate environmental performance and provide feedback to the Project Engineer/Manager.

b) Employees are responsible to:

- oversee staff and audit work processes to ensure that they are working in an ecologically responsible manner; and
- evaluate environmental performance and provide feedback to the Project Engineer/Manager.

c) Internal monitoring department

The product owner will design and implement an auditing program to track, assess, and report on environmental performance and policy compliance. The Environmental Manager will be in charge of monitoring the policies' implementation, performance, and effectiveness.

d) Meetings

Prior to the start of any work, on-site meetings with the Project Engineer, Manager, staff (in the form of toolbox discussions), and EPA-SL officials will be held, as well as periodically as work continues, to evaluate the ESMP's implementation.

8.2 Policy on Environment and Health and Safety

8.2.1 Policy on Environment

The company's regular operating procedure would be to build and run the project under the Dura Plast (SL) Limited Environmental Policy and Environmental Management System (EMS). The following are key features of the policy:

- An understanding that good environmental management is critical to the facility's performance.
- All employees must be held accountable for reducing environmental risk and adhering to statutory standards as well as Dura Plast (SL) Limited's corporate environmental goals.
- Implementation of monitoring programs to provide early notice of any deficiencies or unexpected results in environmental safeguards

- Employee training and orientation in order for them to do their tasks in a way that is environmentally friendly.
- Environmental issues must be considered in all new or modified facilities, as well as in the company's purchases of equipment and materials.
- A mechanism for reporting environmental incidents would be established, and incident reports would be issued in a timely manner;
- Completion of environmental response planning, including spill prevention, control, and response plans, monitoring plans, and mitigation plans, to provide the foundation for responding to environmental incidents.
- Conducting periodic evaluations to ensure that environmental performance is being monitored and improved upon.
- Establishing mechanisms to ensure continuous communication with government organizations in the event of regulatory changes that may affect the business.
- Internal/external auditors will conduct periodic audits and evaluations to ensure conformance and certify management behavior is compliant with environmental regulations.

8.2.2 Policy on Health and Safety

This policy establishes the framework for the establishment of Health, Safety, and Loss Prevention (HSLP) Standards, Procedures, and Guidance that will address the environment, risk assessment, information and communication, control activities, and Core Business Process monitoring. The following is the company's health and safety policy:

- The Company will identify and control health and safety exposures and hazards that have the potential to cause harm to people, equipment, processes, the work environment, or community health.
- The company will follow Labour Safety Principles, which include HSLP leadership among all employees.
- The Company will establish and maintain an HSLP management system that detects, evaluates, and manages HSLP risks.
- The Company will establish quantifiable objectives and targets to guide the ongoing improvement required to provide an injury-free, healthy work environment and possibilities for community health improvement.
- The Company will adhere to all applicable legislative and regulatory requirements. • The Company will identify and control health and safety exposures and hazards that have the potential to cause harm to people, equipment, processes, the work environment, or community health.
- The company will follow Labour Safety Principles, which include HSLP leadership among all employees.
- The Company will establish and maintain an HSLP management system that detects, evaluates, and manages HSLP risks.

- The Company will establish quantifiable objectives and targets to guide the ongoing improvement required to provide an injury-free, healthy work environment and possibilities for community health improvement.
- The Company will adhere to all applicable legislative and regulatory requirements.
- The Company's operations will be reviewed by internal and external resources to ensure that the HSLP organizational goals and objectives are being met, and
- The Company will publicly report its HSLP performance in order to achieve superior HSLP performance.

The Company's on-site workforce is in charge of making sure that health and safety policies and procedures are followed and documented properly. Annually, or as needed, policies and procedures are revised to reflect site-specific requirements. Prior to beginning work-related tasks, all employees and contractors must be given detailed descriptions. Policies, prevention programs, procedures, health/hygiene, and mandatory authorizations are all included in the policies and procedures document.

8.3 Waste Management Plan (WMP)

This WMP is critical for the company's operations because the project will generate a large amount of diverse waste types. The following goals serve as the foundation for the project's work plan.

- The establishment, implementation, and maintenance of waste segregation targeted at boosting recycling, with the goal of minimizing overall emissions/discharges that have a negative impact on the environment
- Ensure that workers are accountable for proper trash handling and disposal, which will be overseen by appropriate waste disposal authorities.

8.3.1 Waste Handling Guidelines

Wastes must be well defined from the source for proper processing and disposal, and the definition must be transferred with the wastes to the final disposal places. All wastes generated during the course of work must be defined and documented in a monthly/quarterly waste stream report, which will be used to track and monitor wastes generated at the site. The following is a list of fundamental information that must be included as a bare minimum for an adequate waste definition:

8.3.1.1 Waste type identification

The following are the key waste categories that will be generated as a result of the project's activities:

Solid wastes include felled vegetation/trunks, woods, metals, papers, printer cartridges, and other scrapped office equipment that must be removed during site clean-up, as well as home rubbish (waste generated from camp kitchens, packing materials, boxes and plastics).

Non-hazardous operational waste generated by work construction sites, such as lubricants, sanitary water, paints, and sewage, are examples of liquid wastes.

Combustion products from construction and operations engines, welding gas, natural gas leaks, and other gaseous wastes are examples.

Hazardous waste is defined as any gaseous, liquid, or solid that, due to its amount, physical, chemical, or infectious qualities, has the potential to harm human health or the environment if correctly handled, stored, disposed, transported, or managed, such as acids and lead batteries.

8.3.1.2 Waste minimization / reduction

Waste minimization entails reducing the volume or toxicity of waste items to the greatest extent practicable. Reduce, reuse, recycle, and recover are the four waste minimization principles that must be followed where possible.

8.3.1.3 Waste segregation

Waste segregation and characterisation should be done on wastes that are comparable and can be combined to make storage, treatment, recycling, and effective waste disposal options easier. Wastes must be separated, preferably at the source, and placed in properly marked bins at strategic locations. The work area, where a variety of trash, including fast food packaging, will be generated, will receive special attention. The waste segregation plan at the site will be maintained by the site environmental health and safety (EHS) officer.

8.3.1.4 Waste disposal

Debris, damaged materials, and other wastes must be removed from the site on a regular basis and disposed of at approved trash dump locations. The instructions on the material safety handling sheet must be followed to the letter and serve as the foundation for the disposal of wastes associated with such products. Garbage disposal notes are required to accompany and track waste in transportation. Date of dispatch, description of wastes, waste quantity, container type, designated collector and method, consignee name, mode of transport, and confirmation of actual disposal time and date shall all be included on the note. Batteries and other items removed from the site, as well as drums of old oil, will be given special attention; these will be transported to a place designated by authorities for safe storage and disposal.

8.4 Emergency Response Plan (ERP)

Before mobilization to site, the company must demonstrate that all potentially significant hazards and potential impacts of project activities have been identified, that the associated risks have been evaluated and understood, and that control and recovery measures to effectively manage these risks and impacts have been implemented. The company must create a generic hazard list for advice. In the event of an emergency, the following emergency response procedures will be activated:

- ensuring that no lives are lost
- ensuring that the environment is preserved
- to ensuring that sufficient staff, equipment, and funding are available to effectively contain an emergency (fire, explosion, shocks, accident, oil/chemical spill clean-up, and so on).

The EHS officer is responsible for identifying all potential emergency circumstances and developing protocols for events like as explosions or fires, hydrocarbon/chemical spills, weather-related disasters, community disturbances, kidnappings, and so on. Emergency exercises must be done to demonstrate preparedness for response, and ehso must develop a plan of drills and testing of emergency instruments. A site-designated emergency assembly location is also required.

There will also be a community emergency response plan that will be tailored to the needs of the community and will include contingencies such as an oil leak.

8.5 Decommissioning/Abandonment Plan

The design and facilities must provide for the need to decommission the quarry site when it reaches the end of its operating life by drafting a decommissioning and abandonment plan at least three months ahead of time. The plan for abandonment must take into account current national and international legal standards. At the end of the project lifespan, the following should be taken into account:

- A team will be formed to study and plan the decommissioning/abandonment program in accordance with the standards.
- An Environmental Evaluation Report (EER) to establish if the site's activities have had any negative consequences and, if so, to consider mitigation and restoration options.
- Comprehensive environmental evaluations must be conducted prior to the actual removal of equipment (demolition).
- If necessary, social-economic studies will be conducted to analyze the community's impact on decommissioning and mitigation.

8.6 Environmental and Social Monitoring Plan (ESMP)

The company will rigorously adhere to the terms of this ESMP and implement a monitoring program that will result in a long-term project-environment relationship. This will be bolstered by EPA-infrequent SL's monitoring trips. To maintain track of the entire project's activities and performance, the monitoring program will begin with site preparation and continue through implementation and operation stages. The program will offer data on consequences compared to predictions, allowing for early detection of any negative changes in both environmental and socioeconomic conditions.

The monitoring program's major goals are to:

- ensure that regulatory emission and discharge limitations are met.
- track changes in the environment's physiochemical and sociological properties, comparing them to both the baseline and projected conditions.
- maintain constant interactions and information flow between the company and its stakeholders.
- determine whether the project or other forces are responsible for any significant changes in socioeconomic and environmental components.
- assess the efficiency of the control and mitigation/enhancement measures, as well as offer a foundation for recommending further measures
- Ensure that the proposed project is carried out in accordance with the specified transparent procedures.

The monitoring lessons will be applied to the appropriate future phases in order to strengthen them even further. The program is intended for the project's early stages. After the first year, the monitoring frequency will be reviewed to verify its effectiveness and, if necessary, to add further identified areas of concern. The EPA-SL is responsible for ensuring that the monitoring program is carried out completely.

Table 14 shows the environmental monitoring scheme established for the project's site development and operating phases.

Table 14: Environmental and Social Monitoring Programme

Environmental Attributes	Parameters to be monitored	No. of Sampling Locations	Frequency of Monitoring	Standards Methods for Sampling & Analysis	Compliance
Air Quality	PM ₁₀ , PM _{2.5} , SO _x , NO _x , and CO _x	3	Three to four times/year	Fine Particulate Samplers for PM ₁₀ , PM _{2.5} , Reparable Dust Sampler for SO _x and NO _x , CO _x analyser/portable CO _x meter	National/international Ambient Air Quality Standards
Soil	Soil contents of pollutants	4	Once every six months	Collection and analysis of samples as per ISO2720	Trend of concentrations.
Noise Levels	Day/night noise level	Regular	Once a month	Portable hand-held noise level meter	Trend of noise level
Water Quality	Physical, Chemical and Biological	4	Once a month (high tide and low tide)	Analysis by using standard methods.	Trend of water quality

8.7 Cost Estimate of ESMP

The cost estimate for implementing the various mitigation, environmental monitoring, and Dura Plast (SL) Limited capacity building programs under the aforementioned project is shown in Table 15.

8.8 Grievance Redress Mechanism (GRM)

To resolve issues amicably between employees, the company, and the community, a grievance redress procedure should be established. When a problem emerges, a senior staff member should be designated to handle it. The GRM will consist of complaining, documenting, settling, and any difficulties that may arise.

Table 15 Cost Estimate for Dura Plast (SL) Limited ESMP

No.	Activity	Intervention plan	Cost (USD)	Action
1	Mitigation measures	<ul style="list-style-type: none"> • site preparation and construction • operational phase • decommissioning 	5,000.00 5,000.00 5,000.00	Dura Plast (SL) Limited
2	Environmental and social monitoring	<ul style="list-style-type: none"> • soil • surface water • noise • community health • socio-economics 	1,500.00 1,000.00 1,000.00 1,200.00 1,000.00	Dura Plast (SL) Limited
3	Dura Plast (SL) Limited	Capacity building <ul style="list-style-type: none"> • Training on the ‘handling and clean ups of used oil spills • Training on environmental health & safety. • Training on Firefighting techniques • Training on Waste management. • Training on emergency response 	2,000.00	Dura Plast (SL) Limited
Grand Total (USD)			22,700.00	

9.0 COMMUNITY DEVELOPMENT ACTION PLAN (CDAP)

This plan is intended to offer a framework for Dura Plast (SL) Limited to fulfill its CDAP obligations to host communities in accordance with Sierra Leone legislation and international "best" practice criteria. The outputs of stakeholder meetings with inhabitants in the host communities, as well as the results of needs assessment surveys undertaken during the development of the environmental baseline conditions in the host communities, are included in this CDAP.

Magbentha Village in Koya Chiefdom, Port Loko District, is the target community. The land leased to the proponent for this project is approximately 22.4 acres. The majority of households are involved in small agrobusinesses and artisanal mining. Some of the women are adept at panning, while some of the youths use biking as a secondary source of money.

9.1 Quality of life Indicators

Sierra Leone was rated 181 out of 189 nations in terms of overall development by the UNDP Global Human Development Index (2018), with an index of 0.438 and a life expectancy at birth of 54.3 years. The average number of years spent in education is 3.6 years, with an average of 10.2 years. In US dollars, the Gross National Income (GNI) per capita is \$1,381. Around 70% of the population lives on less than Le2,111 per day, the national poverty level. Rural poverty is the most common type of poverty. Younger Sierra Leoneans are increasingly leaving rural areas in search of more financially rewarding and secure professions, yet they frequently fail to do so in Sierra Leone's towns and cities.

The New Direction's Mid-Term Development Plan Sierra Leone's government placed a high priority on reducing unemployment and poverty. However, at 70%, young unemployment and underemployment remain high, and food security remains a key concern, hampered by a lack of market access and poor rural infrastructure. Official Development Assistance (ODA) is significantly reliant on the country, with ODA funding accounting for over half of all public investment programs. Sierra Leone's weak national infrastructure and limited private sector are key roadblocks to achieving higher levels of growth, which are necessary to successfully reduce poverty and unemployment. The government is attempting to enhance food and cash crop production while also partnering with a number of international donors, including the United States, to implement integrated rural development and agricultural initiatives.

9.2 Standard of living in the Project Influence Zone

To make enough money to survive, residents engage in a variety of activities. This section contains information on the local population's income, expenditures, and other indices of living standards.

According to the home survey, 58 percent of the adult population in the Project area (ages 18-60) does not have a consistent and reliable source of income.

9.2.1 Food Security

The Project area's community diet consists primarily of locally produced staple foods (particularly rice) and locally cultivated vegetables. Fish is consumed more frequently than beef, which is consumed only on rare occasions due to its high cost. In a household study, 63 percent of respondents said they have food shortages at some point during the year, primarily between July and September.

9.2.2 Energy sources

In the Project area, household lighting is primarily provided by Chinese-made solar touch lights, however some utilize battery-operated lights and a few use candles and kerosene lights. Firewood and charcoal are the primary sources of energy for cooking. In the two settlements, there are no electrified public (street) solar lights.

9.2.3 Vulnerable groups

It is critical to identify vulnerable groups while doing a social assessment. The inability to generate adequate resources to meet fundamental human requirements is characterized as vulnerability (i.e. food, sanitation, health services, education and shelter). Those who are unable to work the land (widows, the aged, and the sick), have no other source of income, and have no family or other social support network are among the most vulnerable. Any future social baseline study must estimate the number of susceptible households in the study region in order to build management plans to address these vulnerabilities in order to fulfill international standards.

9.3 Health and Sanitation Status

Access to health services is quite challenging, particularly during the rainy season when road conditions are particularly severe. Many people rely on traditional healers since they cannot easily access clinics and hospitals. Improvements in the time and cost of transportation along the highway will allow more individuals to receive higher-quality health care.

In Magbonthoso (Mile 38), there is only one community health center, which is not suited to handle major illnesses. Patients with serious ailments are occasionally referred to Masiaka Hospital or Freetown for treatment. The majority of residents commute by foot or motorcycle, which is pricey when seeking medical attention.

In general, the health and sanitary conditions in the locations under investigation are poor. According to the household survey, all households dump their garbage in their backyards and in their workplaces without discrimination.

The majority of houses lack adequate toilet facilities, and water wells, streams, swamps, and rains are the primary sources of water.

The top health problems include bodily pains, headaches, and malaria, according to a household survey that listed health problems encountered by local inhabitants and an interview with the community health officer (CHO). Fever, cold, diarrhea, cholera, typhoid fever, sexually transmitted infection (STI), and blood pressure are the next most common illnesses. However, it should be emphasized that in African rural communities, these are frequently used as a label for general illnesses and fevers. Furthermore, these are based on symptoms reported by residents rather than a professional medical diagnosis.

9.4 Education

9.4.1 National Context

Sierra Leone offers free primary school for the first six years and junior secondary school for the next three years. All children must attend school and are entitled to a free education. This legislative requirement, however, will be impossible to fulfill due to a scarcity of schools and teachers. In 2001, 1,270 primary schools were damaged in the civil war, and 67 percent of school-aged children did not attend school. Compulsory education lasts nine years, from the age of six to fourteen. For all levels of education, from primary to post-secondary, the academic year runs from September to July. For pre-primary, primary, secondary, and university education, the official school ages are 3-5, 6-11, 12-18, and 19-23 years, respectively (UNESCO). For all levels of education, from primary to post-secondary, the academic year runs from September to July. For pre-primary, primary, secondary, and university education, the official school ages are 3-5, 6-11, 12-18, and 19-23 years, respectively (UNESCO). Table 16 shows the population of school-aged children.

Table 16: School-age population by education level	
School level	Population
Pre-primary	653,316
Primary	1,231,773
Secondary	1,234,517
Tertiary	662,880

The situation has substantially improved since 2001, with primary school enrollment more than doubling and numerous schools being restored. The educational system, on the other hand, continues to face a plethora of problems. In many rural primary schools, there aren't enough trained and accredited educators. The government's recent drive to encourage children to attend school, however, has resulted in congestion at most institutions.

In addition to teacher training colleges and religious seminaries, the country presently has six universities (one private and five public), as well as teacher training colleges and religious seminaries, with two more on the way in Lunsar and Kono. Higher education is further hampered by a lack of resources, resulting in a scarcity of critical professionals in scientific and technological education, applied agricultural research and extension, and health care. In 2018, the adult literacy rate in Sierra Leone was 43.2 percent. Sierra Leone's adult literacy rate increased by 13.18 percent per year from 34.8 percent in 2019 to 43.2 percent in 2021. The tables below show the literacy rate and illiterate population by age and gender.

Table 18: Illiterate population

	TOTAL	MALE	FEMALE	
Literacy rate (%)				
15-24 years	66.65	70.58	62.7	(2018)
15 years and older	43.21	51.65	34.85	(2018)
65 years and older	4.58	9.71	0.72	(2018)

Source: UNESCO web site

9.4.2 The Project Influence Zone

The population in the project area has low levels of education and literacy, according to the household survey. It is clear that literacy is low (15%), with just a tiny percentage of people finishing secondary school or obtaining a tertiary education.

During the ESHIA research and subsequent stakeholder interaction, the importance of education was often emphasized by the local population. Education was viewed as a means of escaping poverty. Investing in a child's education is a risky business because it requires financial sacrifices and there is no guarantee that the child will succeed.

9.5 Local Infrastructure

Some frequent characteristics of local infrastructure are as follows:

- The infrastructure in the project influence zone is generally inadequate.
- There is no energy given by the government in the area.
- The coverage of mobile phones is only partially adequate.
- There are no paved roads in the project area, and the ones that are there are in a bad state.

9.6 Community Engagement and Development

By establishing programs and fostering open communication, Dura Plast (SL) Limited has identified community participation and partnerships as critical to producing major long-term benefits for communities. The company will form strong relationships with these communities, with the intention that this project will be an important aspect of the company's overall community engagement strategy and will aid in the achievement of the CDAP goals.

The CERQM will work closely with national, local, and traditional government, as well as other agencies, to achieve goals and objectives on behalf of its clients. Because it addresses social and environmental issues comprehensively, this will serve as a model for future development.

The initiative has identified key activities that will contribute to the community's development. The proposed activities will be carried out in close conjunction with existing community institutions in the mine project area, and they are intended to have a long-term impact on local communities. School(s), religious house(s), ferryboat(s), and other public projects were recognized throughout the first two years of the CDAP's implementation.

9.7 Dura Plast (SL) Limited CDAP Proposal in Agreement with the Community

9.7.1 Key CDAP Activities

In order to track and assess the socioeconomic impact of CDAP measures, CERQM will work closely with the Company's Community Relations Department to construct a program for implementing key development indicators against the baseline set in the initial survey. This will be in line with the CDAP's objectives.

9.7.2 Implementation Arrangements

The CDAP will be planned, executed, and coordinated by Dura Plast (SL) Limited and the Community Development Committee (CDC), which will be made up of members from the following organizations.

- Community members who have been personally impacted Officials from the community who can assist
- Relevant non-governmental group (only as an observer) functioning in the region
- Individuals from Dura Plast (SL) who are relevant

The stakeholder engagement committee (SEC) will be made up of the councilor, an elder representative, a youth representative, and a woman representative. These committees are responsible for facilitating and transmitting messages between the CDC and the corporation at the grassroots level. The host communities have produced a community development agreement (CDA) that has been accepted.

Community development initiatives would be developed on the basis of the community development strategy, which aims to maximize the social welfare of the communities within the project's influence zone. These initiatives would prioritize appropriate intervention aimed at achieving sustainable development in an equitable manner among the various identified beneficiaries.

The following procedures will be taken to prepare the CDC for the start of project implementation:

- Establishment of the CDC
- Selection criteria for membership on the Committee
- Establishing operating procedures for project selection, approval, and execution; and
- Establishment of mechanisms for monitoring, evaluating, and reporting
-

Table 19: CDAP Proposed Activities

No.	Name of Community	Time Frame	Implementing Activity	Estimated Cost(Le)	Responsibility
1.	Magbentha	2022	Construction of Health Centre	100,000,000.00	Duraplast (SL) Limited
2.	Makossea	2023	Construction of Elementary School	100,000,000.00	
3.	Wire Line	2024	Provision of water facility-Borewells with hand pumps	100,000,000.00	
4.	Songo	2025	Support to women empowerment through the provision of micro finance	100,000,000.00	
Total estimated cost (Le)				400,000,000.00	



CDAP Consultative meeting with Stakeholders.



Stakeholders Consultative Meeting.

9.8 Financing

The proposed CDAP was created with the goal of enlisting the help of other partners, in addition to Dura Plast (SL) Limited, to help the leased area develop. Dura Plast (SL) Limited is to invest Le200,000,000 for the CDAP initiative over a two-year period to community development efforts in the Magbentha neighbourhood. At the end of this term, the CDAP will be renewed to cover the remaining year(s) of operation.

9.10 Monitoring and Evaluation

The beneficiaries will be involved in the monitoring and evaluation of the Magbentha community development project(s). Monitoring and evaluation for effective involvement would include:

- Joint creation of project goals; performance indicators; monitoring, benchmarks, and consultative evaluation;
- Building stakeholder capacity to assess, reflect, and act in terms of evaluation; and
- Creating a foundation for remedial action based on consensus

10.0 CONCLUSION

This paper examines potential repercussions, their severity, and the breadth of Dura Plast (SL) Limited steel production operations on the environment, ecosystem components, socio-economics, and mine workforce sociology. The implementation of the project is predicted to have a negative influence on the land surface, causing soil erosion and deterioration, as well as on surface water, forest cover, air quality, and vegetation cover.

The most significant negative consequences have been identified and assessed, and they can be reduced through monitoring and a step-by-step environmental rehabilitation program. According to the research, the project's launch will have detrimental effects on forest cover, farmland, air, and water quality. Environmental rehabilitation measures as an important aspect of sustainable land use, surface water pollution and depletion with prevention methods are included in the report's mitigation and impact elimination recommendations. The study also includes environmental rehabilitation planning, environmental protection planning, and an environmental monitoring program. The mining operations are predicted to have mostly favorable economic and social consequences.

The Environmental, Social Management Plan (ESMP) provides the project proponent's primary environmental, social management, and safeguards for managing the project's key environmental issues/impacts. The Environmental and Social Management Plan (ESMP) is a system for ensuring that environmental and social factors are factored into project planning, design, construction, and project supervision and monitoring. These are strategies for reducing or offsetting the project's possible negative environmental impacts from diverse activities.

The developed ESMP consists mostly of mitigating measures, a monitoring strategy, and costed recommendations. The offered ideas are tailored to the project and the local environment in Koya Chiefdom, Port Loko District.

The CDAP operating plan aims to codify Dura Plast (SL) Limited's ESHIA declaration, which was submitted to the EPA-SL as a live document. It is an endeavor to identify and prioritize community development activities, as well as rationalize resource allocation, in order to improve not only the social welfare of the host community, but also to offer a platform for supporting long-term growth. In this way, the CDAP can be viewed as a planning tool that will allow Dura Plast (SL) Limited to fulfill its CDAP obligations.

Any possible dispute between Dura Plast (SL) Limited and the host community should be managed through careful management and a well-developed GRM. As a result, it should ideally promote a win-win solution to the project implementation arrangements' potential repercussions.

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ANNEX I: TERMS OF REFERENCE

In order to assess in more detail, the environmental social and health impacts associated with the Project, certain specialist studies have been identified, which shall include the following:

Air Quality Assessment

The machineries have the potential to increase the amount of air pollution within the area due to fuel combustion for power generation, and the possible release of Carbon dioxide (CO₂) and Nitrogen dioxide (NO₂). In light of this, the Terms of Reference for air quality Impact Assessment is as follow:

- Detail the risk sources of air pollution from the project operation.
- Suggesting ways to avoid, mitigate, or ameliorate the impacts by discussing modifications or improvements.

Noise and Vibration Impact Assessment

The proposed noise and vibration Assessment is as follows:

- Undertake the collection of baseline data from various sources in order to determine noise and vibration levels emitted from surrounding activities;
- Recommendation of mitigating and monitoring measures.

Water Management Assessment

Potential effect of the operation on surface and ground water resources will be investigated. Recommendations will be provided to ensure that no contaminated surface water runoff is allowed to run into adjacent swamps and/or Rivers if any.

The Assessment will cover the following;

- Comment on the risks of polluting ground and surface water resources at the project area.
- Provide feasible recommendations for the mitigation of impacts on ground and surface water resources.

Wastes (Solid and Liquid) Management Assessment

This will cover description of all wastes generated by the project operation.

The study may need to consider the following effects:

- Waste quantification, collection, storage and disposal;
- Waste avoidance and recycling;
- Septic system including disposal of liquid effluent and other wastes.

Biodiversity Assessment

In order to assess the level of impact, it is necessary to determine the baseline condition of the project area. The assessment will focus on the presence of species in the project area. The ecological and biodiversity value of the habitats and animal communities within the study area will also be determined.

The study will use observations/direct sightings and structured interviews with key informants in the area (i.e., hunters and community inhabitants).

Specific Terms of Reference include:

- Establish the impacts of the operation on terrestrial flora and fauna in the area.

- Provide recommendations and mitigation measures that will reduce negative impacts on biodiversity.

Socio-Economic Assessment

The operation will result in national, regional and local economic benefits. At local level it could also provide job opportunities.

The primary objectives of this study will be:

- to provide a detailed description of the socio-economic environment in and around the operation area.
- to analyse the potential impacts of the operation.
- to provide mitigation measures - Both positive and negative.

The Terms of Reference for the proposed Social Impact Assessment is as follows:

- Develop an updated socio-economic baseline description;
- Conduct an assessment of the socio-economic impacts (both negative and positive) of the operation.

Occupational Health and Safety Assessment

Occupational health and safety issues outline below will be elaborated in the ESHIA Study.

- General workplace health and safety
- Hazardous substances
- Physical hazards
- Fitness for work
- Thermal stress
- Noise and vibration

Structure of the ESHIA Report

The proposed ESHIA Report content shall include the following chapters:

1. Introduction
2. Project Description (including project alternative)
3. Policy, and Legislative Context; both National and International
4. Description of the Environment and Socio-economic Baseline of the project area
5. Stakeholders Consultations (PPP)
6. Potential Impacts and Mitigation measures
7. Environmental and Social Management Program

The management program shall include:

- Environmental and Social Management Plan (ESMP);
 - Water Management Plan;
 - Waste Management Plan,
 - Chemicals Management Plan;
 - Conflict Redress Mechanism;
 - Emergency Preparedness Plan;
 - Community Development Action Plan; and
 - Training programme
 -
8. Conclusion summarising the entire outcomes of the ESHIA studies based on the assessment

ANNEX II: TIMETABLE FOR THE ESHIA PROCESS

ESHIA Process Scheduled

Activity	Time Frame	Responsible Parties
Application for EIA Licence	August 2021	Proponent
Preparation and submission of screening form	August – September 2021	Consultant and proponent
Conducting ground truthing	October 2021	EPA-SL, proponent and consultant
Initial Environmental Examination (IEE); preparation and submission of scoping report	October – November 2021	Consultant with participation of proponent, stakeholders and host communities
Detail study of major Environmental, Social and Health concern, preparation of ESMP and CDAP	November 2021– December 2021	Consultancy firm with inputs from stakeholders
Public Disclosure	December – February 2022	Consultancy firm, proponent and stakeholders