ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY
ON
SIERRA TROPICAL LTD's FRUIT PROCESSING FACILITY

ADDENDUM TO THE ESIA ON SIERRA TROPICAL LTD'S AGRICULTURAL PROJECT IN BO

Prepared by

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Freetown, Sierra Leone

on behalf of:

SIERRA TROPICAL LIMITED (STL)

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LIST OF ACRONYMS

^{0}C Degrees Celsius
% Percentage
″ Inch
Al Aluminium
AMSL above mean sea level
BOD Biological Oxygen Demand
CBD Convention on Biodiversity
CBO community-based organisation
CDAP Community Development Action Plan
CEMMATS Construction Engineering Maintenance, Manufacturing and Technical Services
CI Corrugated Iron
CITES Convention on International Trade in Endangered Species on wild flora and fauna
Cl Chloride
cm centimetre
Cm^2 Square centimetre
COD Chemical Oxygen Demand
dB decibels
EPA-SL Environment Protection Agency – Sierra Leone
ESIA Environmental and Social Impact Assessment
ESMP Environmental and Social Management Plan
FAO Food and Agricultural Organization
FMC Food Machinery Corporation
GDP Gross Domestic Product
GIS Geographic Information Systems
GoSL Government of Sierra Leone
GPM Gallons Per Minute
GPS Global Positioning System
HC Hydrocarbons
HDI Human Development Index
IFC International Finance Corporation
IMR Infant Mortality Rate
IQF Instant Quick Frozen
IVS Inland Valley Swamp
JSS Junior Secondary School
KVA Kilo Volt Ampere
Le Leones
m metre
MDA Ministries, Departments and Agencies
NGO Non-Governmental Organization
PAPs Project Affected Persons
PCDP Public Consultation and Disclosure Plan
PM Particulate Matter

PRSP Poverty reduction Strategy Paper
RH Relative Humidity
RO Reverse Osmosis
t tons
TOR Terms of Reference
WMP Waste Management Plan
WWTP Waste Water Treatment Plant

EXECUTIVE SUMMARY

Introduction

Sierra Tropical Ltd (STL) is a wholly owned subsidiary of Dole Asia Holdings Pte Ltd, a Singapore-based agro-processing company. The Company arrived in Sierra Leone in 2014 with the aim of embarking on an agro-processing project involving large scale planting and processing of tropical fruits in Bo District, southern Sierra Leone.

In compliance with local regulations EPA Act 2008/2010, STL applied for and was granted an EIA Licence in 2018, covering the first two phases of project implementation, involving the development of up 4,335 hectares of agricultural land in the Lugbu Chiefdom.

Depending on the success of the first phase and early second phase of the project, in terms of quality/productivity of the fruits, it was planned that a processing facility would be constructed in the later stages of the second phase, to process the raw materials into manufactured products in various packages of cans, drums, plastics and boxes. It has now been confirmed that the project will proceed with the development of the processing facility, necessitating an extension of the original ESIA study.

This report is the addendum to the original ESIA on STL's Agricultural Project, covering the construction and operation of the fruit processing facility in Sumbuya, Lugbu Chiefdom. An addendum to the original ESMP has also been developed, which builds on the framework developed in the original ESMP, describing the processing facility-specific management, mitigation and monitoring controls to be effected.

Project Area

The processing facility will be located in Sumbuya, within a plot of land already leased to the company during the initial land acquisition, in the earlier stages of phase 1 of project implementation.

The area of the project site is 30 hectares and its centre is situated at 7 degrees 43'30.55N and 11 degrees 54'44.07W.

The distance from the road which is basically the middle of Benduma Village, to the project construction site centre is 850m. This distance limits the possible effects of the processing facility on the village, and the Sewa River on which it heavily depends.

Description of Project

This project description provides information on the 2 main phases of the facility – construction and operation.

The construction phase of the project is estimated to be implemented over the course of 18 – 24 months, and includes the construction of the facility and installation of the various equipment and machinery. It also involves the construction of a 2-way (6.7m wide and

approximately 11km long) road network and storm drainage systems capable of handling 200mm/hr rainfall intensity. This stage will also include the development and installation of an open lagoon system for waste water treatment plant (WWTP) which will be a combination of settling (in the first ponds) and aerobic (in the 2 second ponds) and facultative treatment (in the remaining three ponds).

The operations phase will involve canning and processing of fruit grown on the STL plantations.

Analysis of Alternatives

The processing aspect of the STL agro-processing operations brings another layer of benefits to the agricultural aspect of the project. Sierra Leone does not have many manufacturing outfits, and relies mostly on the export of our raw materials to other parts of the world for processing.

The option of processing the fruits brings with it several benefits at local and national levels including the following among many others:

- Employment and skills training in a niche area of production (fruit processing).
- Export of locally produced and manufactured goods and presence of made in Sierra Leone products on the international market.
- National revenue generation

The project technology and operational model to be implemented has been chosen due to its effectiveness in other areas of the world where Dole operates.

Dole pineapple operations today currently operate Processing Facilities in the Philippines and Thailand. This operation is modelled on the Dole Philippine (DoleFil) operation for Fruit production and Processing, where there are two processing centres. The basic design of the facility in Sierra Leone is closely based on the latest expansion of the 2nd facility in Dolefil, both of which are operating successfully.

Policy, Legal, Regulatory and Institutional Context

During the main ESIA study covering the development of the agricultural aspects of the first two phases of the STL project, several laws, policies and plans were discussed, as well as the Institutional bodies with influence on a project of this nature. For the purpose of this study, the following legislation specific to a construction project and factory-type operations are discussed:

- The National Employment Policy and Action Plan, 2015
- The National Energy Policy, 2009
- The National Road Safety Policy, Strategic Plan and Trust Fund, 2013
- The Factories Act, 1974

- The Sierra Leone Local Content Agency Act, 2016
- The Sierra Leone Roads Authority (Amendment) Act, 2010
- The National Water Resource Management Agency Act, 2017

Institutions with a bearing on a project of this nature were also discussed as follows:

- The Ministry of Labour and Social Security
- The Ministry of Works and Public Assets
- The Ministry of Trade and Industry
- Sierra Leone Investment and Export Promotion Agency
- Sierra Leone Roads Authority

This section also discusses the Multilateral Investment Guarantee Agency (MIGA) Performance Standards applicable to the project, describing how they are addressed in the ESIA:

- PS1: Assessment and Management of Environmental and Social Risks and Impacts
- PS2: Labour and working conditions
- PS3: Resource Efficiency and Pollution Prevention
- PS4: Community Health, Safety and Security
- PS 5: Land acquisition and Involuntary Resettlement
- PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PS 7: Indigenous Peoples (IP)
- PS 8: Cultural Heritage

Baseline Survey and Condition

The baseline assessment was carried out on the physical, biological and social environments. The physical environment of the project area lies within the environmental boundary considered during the original ESIA study and remains largely unchanged. Site specific noise, dust and wind speed measurements were taken in various locations. The following bullet points highlight key outcomes:

- The climatic data are fairly typical for this time of year, with high temperatures particularly in the afternoon hours. Relative humidity values are average and wind speed values low, ranging between calm (0.0m/s) and light air (1.3m/s) categories.
- Nuisance dust which refers to dust particles that are typically found lying on surface, and are too big to be inhaled, was found to be within reasonable limits, with no values recorded exceeding 50µg/m^3. Thoracic dust, was however found to be quite high in all

the locations measured; all measurements exceeded the recommended threshold of 25 $\mu g/m^3$.

- The WHO recommends that noise levels during the day time noise levels for outdoor residential/community settings of no more than 55dB; maximum noise levels in all areas measured, exceeded this threshold.
- The communities around the project site rely mainly on the Sewa River for their water needs. The Beye Stream, is another water source identified fairly close to the project site, and a hand dug well identified in Benduma Sewa. The physico/chemical analysis of the water sources indicate that many of the parameters are within the WHO recommended limits for drinking water.

Description of the Social Environment

The main ESIA report describes the national, regional and project area socio-economic and political contexts. It also included a socio-economic survey which was conducted in 22 villages within the STL start-up area, including the closest community to the site proposed for the development of the facility, Benduma Sewa.

The Benduma Sewa is a small village in the Magbao Section of Lugbu Chiefdom, and at the time of the study, was made up of a population of 160 (including 50 children). The Magbao section is one of 6 sections in Lugbu Chiefdom, and is made up of a total of 7 small villages (Benduma Sewa, Heima, Karleh, Tongeh, Gbanahun, Vanima and Kpatema).

The general occupations of residents in Benduma Sewa are agriculture, diamond mining and some fishing activities. The agriculture sector, engaged in by most of the inhabitants, is dominated by crop farming which is mostly done on a subsistence basis, with the use of rudimentary production techniques. The main crops cultivated are rice, cassava, groundnut, potatoes, yam, cocoyam and palm oil plantations. Fishing is also done in the Sewa River which is less approximately 300 meters from the village.

The village has a total of 34 houses (6 thatch roofed and 28 zinc roofed houses). The only community facilities are a mosque and an open field, popularly used for football. No other facilities such as a local meeting house (*court barray*), church or school, were identified.

Zinc roofing in provincial villages is usually an indication of relatively higher standard of living. During consultations, the Town Chief revealed that following the payment of the crop compensation and annual land lease fees by Sierra Tropical Ltd, 14 thatch roofed houses had been rehabilitated and transformed into zinc houses.

This study involved consultations with the local populations in and around Benduma Sewa, with the aim of disclosing information on the project to them through discussions and interactive sessions. A general chiefdom stakeholder meeting was held in Sumbuya, and subsequent meetings held in Benduma Sewa and Gelehun.

Information on the proposed development of the processing facility was received positively, with some participants from Benduma Sewa expressing their continued support of STL, highlighting their good relationship with the company since the inception of the project.

Comments and questions varied widely, but several questions were fielded around the construction of the facility, regarding start date, duration and employment opportunities during this phase. A few participants while supporting the project, stressed the importance of looking into community health and safety issues related to road accidents and dust generation resulting from the movement of produce trucks plying community roads. Clarification was also sought on the issue of job opportunities and how hiring will be handled and whether women will be encouraged to apply.

Identification of Potential Impacts

This section identifies and describes the potential environmental and social impacts of the processing facility development and operations, on the biophysical and socioeconomic conditions of the environment and communities. Tables Table 7.2-6, Table 7.2-7 and Table 7.2-8 present the identified impacts and selected mitigation measures to be implemented during the construction, operational and decommissioning phases of the project.

Impacts during planning and construction are often temporary; the main concern will be ensuring that designs are done in such a way as to limit the negative environmental and social impacts that could occur during construction and operations. Traffic accidents, occupational safety incidents, as well as environmental impacts are paramount. Risks can be reduced by strict adherence to best construction management practices.

Once best practices have been observed during the initial stages of the project - planning/design set up and construction stages - much of the threat to the safety and integrity of the environment and society will be reduced, during the operational phase, to levels defined by legislation and best practices.

It is now common practice that closure operations are integrated into the planning/design, and operational stages, as the environmental gains of implementing certain mitigation measures may take much longer to be realized. Closure activities are generally performed to stabilize the site, and remove fixed and moveable surface and sub-surface structures. Impacts generated during this phase are similar to construction phase impacts and are often temporary, clearing up within a short space of time from completion of the decommissioning activities.

Summary and Conclusion

The Sierra Tropical Agro-processing project includes the establishment of fruit plantations and a processing facility in Bo District, Sierra Leone. The project intends to roll out in phases, with the start-up areas for the first 2 phases of the project being implemented in Lugbu Chiefdom.

An ESIA study covering the start-up phases of the project was conducted and an EIA Licence issued in 2018. This addendum provides additional information on developments to be implemented during these phases, in the form of the processing facility.

This addendum builds on the original ESIA studies, describing components of the facility's development including construction and operations. The environmental and social baselines within and around the project site are investigated and described, and relevant legislation applicable to the construction and operation of such a facility discussed.

A separate volume, which serves as an addendum to the main Environmental and Social Management Plan (ESMP) developed during the initial ESIA studies, has been prepared. It centres on the management of impacts identified in this study, relating specifically to the processing facility.

Environmental impacts of the project's components have been identified for all phases of the project. Mitigation measures have been presented and management plans developed to effectively manage identified impacts.

The design and construction phase of the project is most crucial, as effective design and planning at this stage, taking into consideration environmental and social issues, will go a long way towards eliminating or minimising impacts during the subsequent phases of the project.

Generally, the investigations reveal that environmental and social problems incurred by the project can be adequately managed and that there are no insurmountable problems that should stop the project from proceeding.

1 INTRODUCTION

Sierra Tropical Ltd (STL) is a wholly owned subsidiary of Dole Asia Holdings Pte Ltd, a Singapore-based agro-processing company. The Company arrived in Sierra Leone in 2014 with the aim of embarking on an agro-processing project involving large scale planting and processing of tropical fruits in Bo District, southern Sierra Leone.

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1.1 Project Area

The processing facility will be located in Sumbuya, within a plot of land already leased to the company during the initial land acquisition, in the earlier stages of phase 1 of project implementation. Figure 1.1-1 shows a map of Lugbu Chiefdom where the 1st phase of the project is being implemented; Sumbuya is indicated by a red dot on the bottom left of the map. Figure 1.1-2 show the plot of leased land on which the facility will be located.

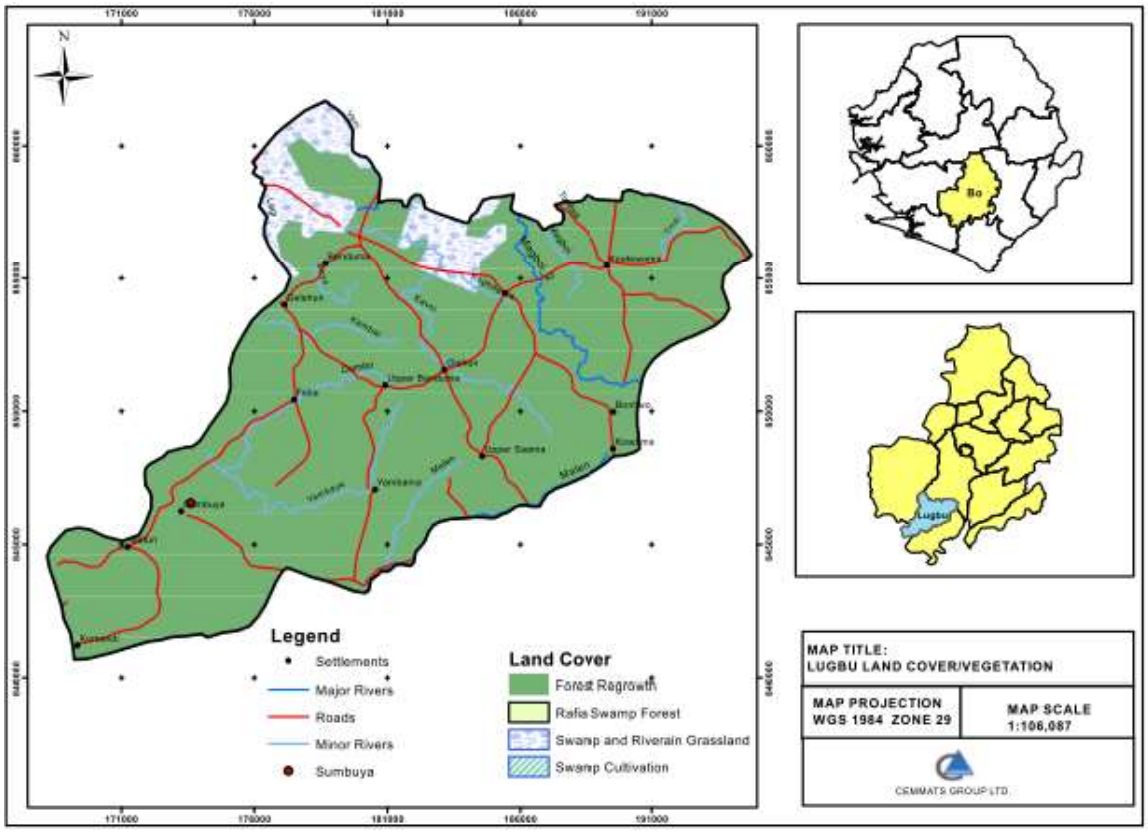

Figure 1.1-1: Map of Lugbu Chiefdom

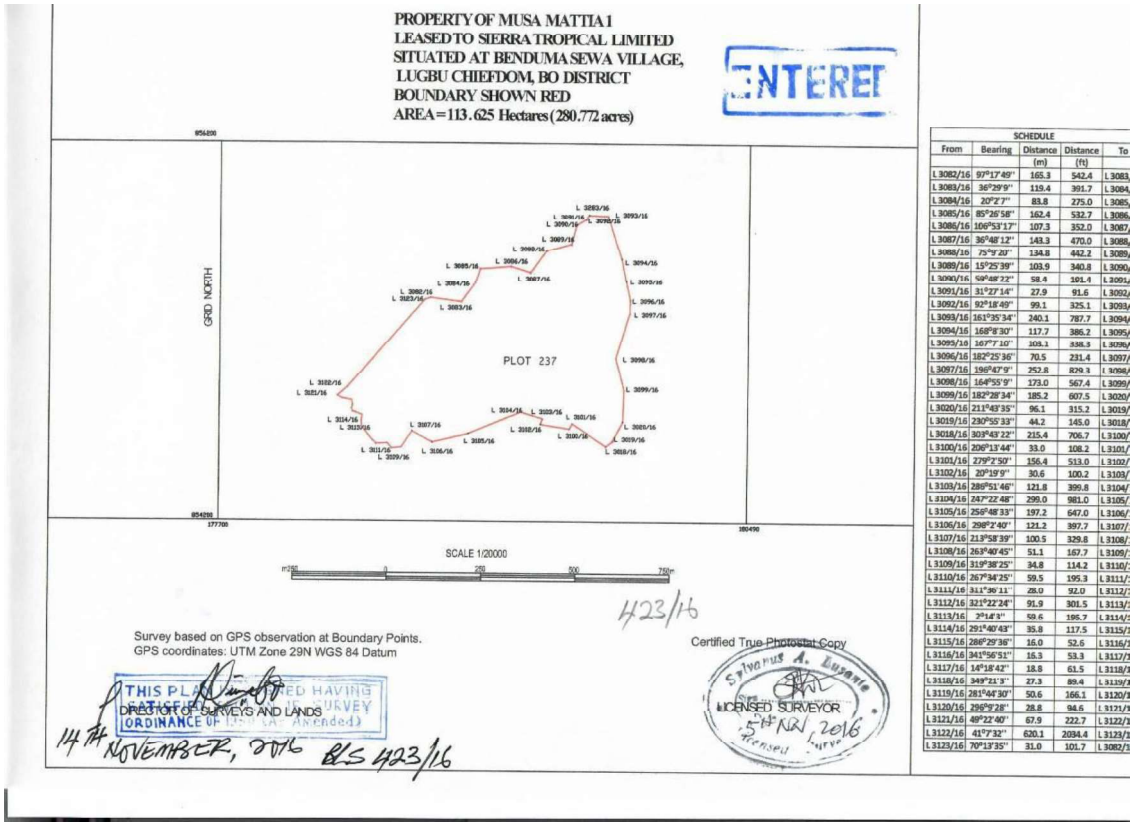

Figure 1.1-2: Plot of Land on which Processing Facility will be developed

Figure 1.1-3 presents Google Earth imagery of the project site.

Figure 1.1-3: Google Earth Image of Construction Site

The area of the project site is 30 hectares and its centre is situated at Lat; 7 degrees 43'30.55N and 11 degrees 54'44.07W.

The distance from the road which is basically the middle of Benduma Village, to the project construction site centre is 850m. This distance limits the possible effects of the processing facility on the village, and the Sewa River on which it heavily depends.

An access road will be upgraded from the main road to the facility, represented by the blue line in Figure 1.1-4.

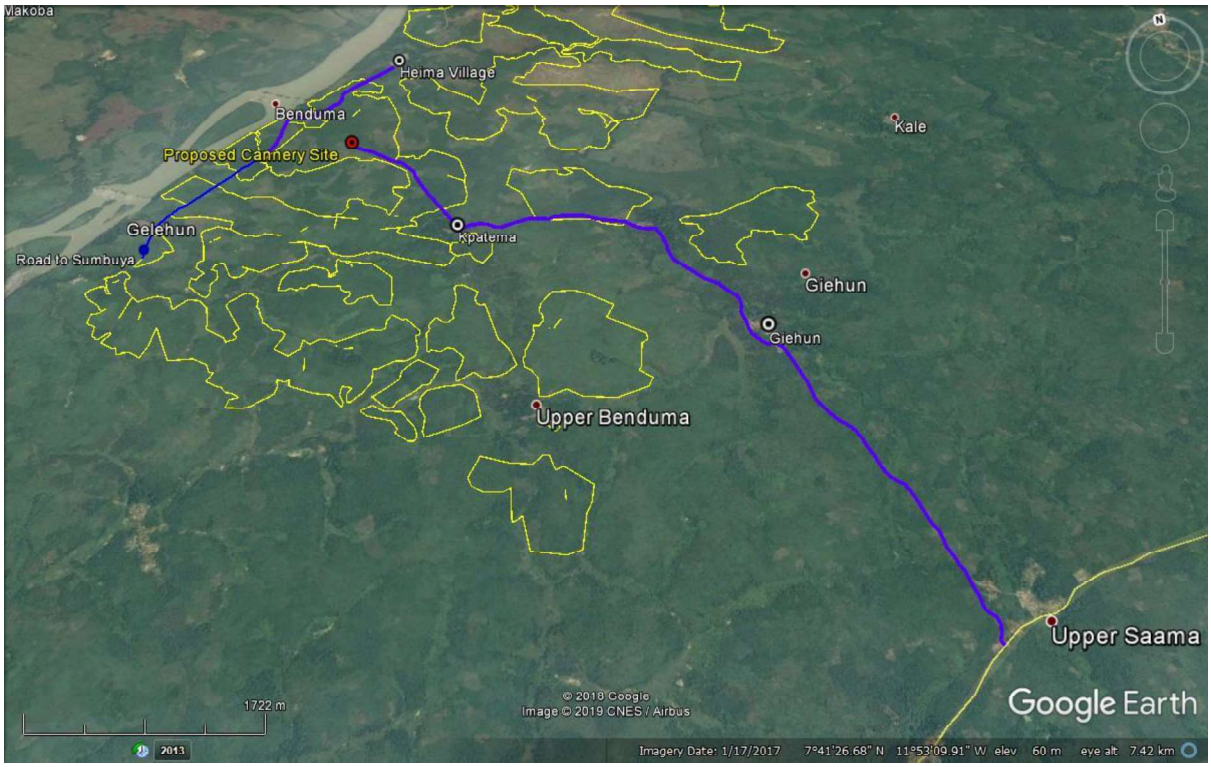

Figure 1.1-4: Access Road to Processing Facility

1.1.1 ESIA Consultants and Teams

A number of specialists were identified to undertake the investigations and address the issues outlined during the ESIA phase. A team was formed of the respective ESIA consultants and sub-teams (Table 1.1-1).

The terms of reference for each of these studies are outlined in the next section. The specialist studies were undertaken during the ESIA phase. This Environmental and Social Impact Assessment (ESIA) ESIA addendum report summarizes all their findings and has been compiled using the information gathered during these studies. The recommendations and mitigation measures developed from these studies have also been pulled together to generate an addendum to the ESMP, which will be adhered to during the various stages of the project.

Table 1.1-1 ESIA Consultants and Teams

Specialist	Specialist investigation
Andrew Keili	Project Director
Vanessa James	Project Manager/Infrastructure and Operations Assessment
Arthur Chinsman-Williams	Hydrologist/water quality specialist
Leonard Buckle	Environmental measurements and observations

Specialist	Specialist investigation
/Rashidu Sinnah	Socio-Economist
Chris Brima	GIS/ Environmentalist

1.2 Description of the Terms of Reference (TOR)

This study commenced in December 2018 and consists of biophysical and socio-economic baseline data collection and impact assessments conducted in the project area. The Terms of Reference for the study is outlined in the following table.

Table 1.2-1 Terms of Reference of the ESIA Study

Field	Objectives	Methodology
Hydrology and Water Quality	• Determine direct physical impacts of the facility on the surface and groundwater. • Recording baseline qualitative and quantitative data. • Suggest mitigation measures to address the impacts noted in the surface and groundwater hydrologic assessment.	Desk study: • A review of existing data on this area will be undertaken together with additional information which may include a review of existing baseline water quality data (local/regional) and the national water quality targets applicable to the project. • Review of water consumption requirements for processing facility, proposed water source and potential impact of usage on community. • Review of waste water treatment methods and release into communities. Field surveys: • Observational assessment of closest and likely to be impacted surface and groundwater sources. • Identify potential sources of pollution. • Identify potential impacts that could result from the proposed project on the surface water resources. • On-site measurement of physical parameters such as pH, Temperature, dissolved oxygen, turbidity and conductivity. • Sampling for laboratory analysis of chemical (anions and cations) and microbiological (faecal and total coliforms) characteristics.
Air Quality	• To identify key aspects that might have significant air quality impacts during all phases of the project. • Ambient and meteorological data will be sourced for the area under investigation. • Point and non-point sources of pollution	Field Work • Identification and quantification of dust and exhaust emissions sources; • Identification of sources of pollution from project
Noise Assessment	To assess the ambient noise levels in settlements in and around the project area in accordance with international guidelines.	Field Work • Sound pressure readings will be taken within and around the proposed facility location.

Field	Objectives	Methodology
Ecology-Fauna	Description of ecology of project area; impact identification and mitigation	Desk Study • Results for the ecological survey for this area in the original ESIA study will be utilised as best as possible. • Identification of ecological impacts related to the construction and operation of the processing facility.
GIS and mapping	Generation of maps for use in discussions on environmental, social and technical issues.	Field Survey Mapping of project boundary as well as key environmental and/or social features within the project area.
Technical Risk assessment	Describe the processing and assess the technical risks of the process including occupational health and safety issues	Description and assessment of the technical processes and related environmental and occupational risks.
Occupational Health and Safety	Discussion of OHS issues relevant to construction and factory operations.	Desk studies and literature reviews
Community Health and safety Issues	Discussion of CHS issues during construction and operations.	Desk studies and literature reviews.
Utility Consumption	Utility consumption during construction and operation will be estimated. Sources of water, fuel, electricity, etc will be discussed	Desk studies and literature reviews.

Field	Objectives	Methodology
Social Impact Assessment	Describe the socio-economic situation within the proposed project area; measure the receptiveness of the facility by community stakeholders; identify potential impacts and their mitigation measures.	Desk Study • Review and update of socio-economic indices and status. Field Work Stakeholder consultations through focus group discussions
Visual Assessment	Description of the existing project site, using photographic representation; discussion on the potential effects of visual changes on the surrounding populace.	• Features of the project installation that are of particular relevance to the visual impact assessment will be reviewed; • Description of expected visual impacts and how these can be managed.

1.3 Scope of Work

The purpose of the environmental impact assessment of the development and operation of the processing facility is to obtain prevailing biophysical and socio-economic data of the project site and surroundings, anticipate the potential environmental and social impacts of the project, and propose an environmental management plan to mitigate adverse impacts whilst enhancing positive ones.

The main ESIA study, to which this study is an addendum, covers the start-up area of the agricultural project covering 4,335ha, within which the site now identified for the processing facility is located. This study centres on the facility project site and surroundings.

1.4 Assumptions and Limitations of Study

1. The EIA study is done mainly to meet the local requirements for securing the EIA licence; relevant international guidelines will be taken into consideration and referred to during the study.
2. The initial ESIA was done to assess the agricultural phase of the project. This study covers the construction and operation of the processing facility and will form an addendum to this ESIA document.
3. Consultation will be carried out and relevant information disseminated throughout the execution of the project which will keep to the tenets of a proper Public Consultation and Disclosure Process (PCDP) for an EIA. However the EPA-SL would normally require that the results of the EIA report are discussed with communities after submission of the report.
4. The timeframe within which the study is carried out will not allow for seasonal variations to be taken into consideration, however desk studies was done on historical climatic data and other records obtained at various times during previous years.

1.5 Organisation of the ESIA Report(s)

This addendum consists of two volumes. Below are brief comments on the contents.

1.5.1 The ESIA Addendum Report

Volume 1 – Environmental and Social Impact Assessment (ESIA) contains the Executive summary and main report. The Executive Summary presents a concise overview of the significant findings recommendations and actions contained in the ESIA.
It discusses feasible alternatives, including the "no project" alternative, and a description of the construction and operational aspects of the processing facility. It includes baseline data describing the relevant physical, biological and historical conditions and the environmental

effects associated with project implementation. Mitigation measures needed to control those effects to acceptable levels are presented.

Volume 2 – Addendum to the Environmental and Social Management Plan (ESMP) presents the environmental management, mitigation, monitoring and institutional measures to be undertaken during construction and operation to reduce adverse environmental and social effects to acceptable levels and to enhance potential benefits.

It builds on the framework developed in the original ESMP, describing the processing facility-specific management, mitigation and monitoring controls to be effected.

1.5.2 Management Plans featured in the ESMP

1.5.2.1 Environmental Health and Safety Plan

The Environmental Health and Safety Plan (EHS) Plan identifies the principles, approach, procedures and methods that will be used to control and minimize the adverse environmental and social impacts of all construction and operational activities associated with the processing facility.

1.5.2.2 Waste Management Plan

The Waste Management Plan (WMP) describes the procedures, systems, equipment, and structures specific to construction waste management and fruit processing related wastes.

The WMP also defines who is responsible for developing and implementing the plan, and what records and reporting will be required.

1.5.2.3 Community Development Action Plan

Specific community development and social assistance programmes aimed at improving the living conditions of the processing facility host communities in a sustainable way are captured under the CDAP.

Public Consultation and Disclosure Plan

Mainly builds on the guidelines in the original PCDP, for the development of a Grievance Redress Mechanism, applicable to both the agricultural and processing aspects of the project. It also describes the public consultations carried out during this assessment.

1.5.2.4 Closure Plan

After the project has reached its economic life span and can no longer be operated in an efficient, reliable and safe manner, the Project reclamation activities are implemented to re-establish a beneficial post-operation land use. All structures would have to be removed in

order to return the site to its pre-construction phase. Monitoring programmes will be implemented to ensure that the site reverts to a natural and useable state.

1.5.2.5 Management, Mitigation, Monitoring and Implementation Measures

The Environmental Monitoring Plan (EMP) outlines the plans for monitoring within the plantation areas and project facilities; key personnel and their responsibilities are also identified.

2 PROJECT DESCRIPTION

This project description provides information on the 2 main phases of the facility – construction and operation.

2.1 Construction Phase

This phase of the project is estimated to be implemented over the course of 18 – 24 months. It includes the construction of the facility and installation of the various equipment and machinery; it also involves the construction of a 2-way (6.7m wide and approximately 11km long) road network and storm drainage systems capable of handling 200mm/hr rainfall intensity.

This section highlights the various construction components, activities and standards to which construction and installation will be carried out to. Figure 2.1-1 presents the layout of the processing facility.

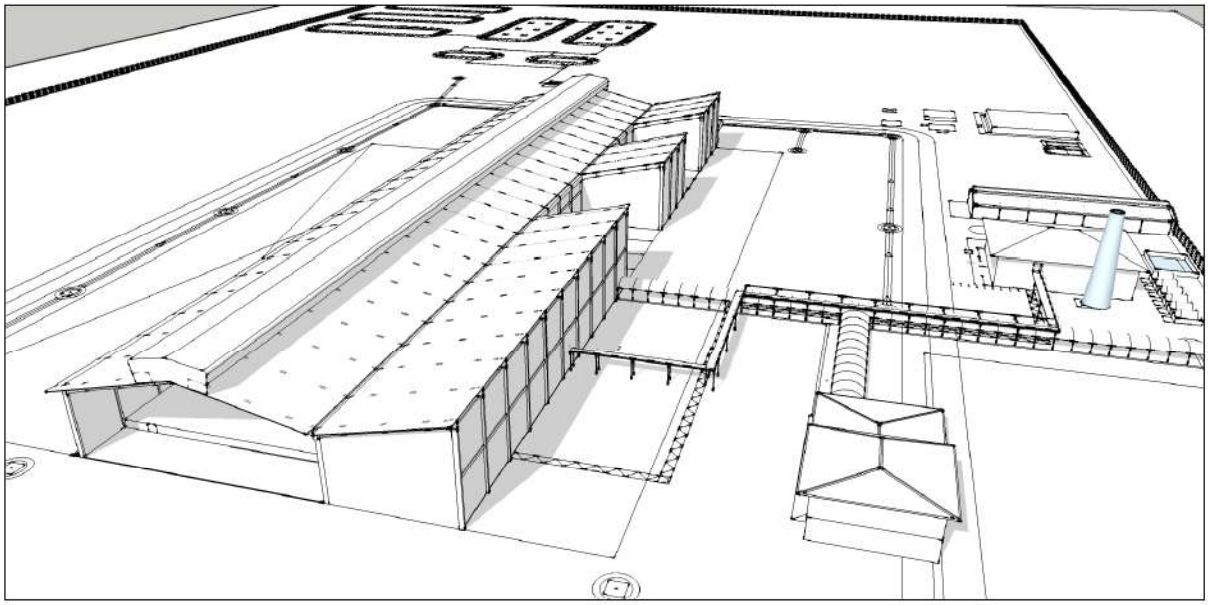

Figure 2.1-1: Layout of Processing Facility

The facility will include the following components:

Table 2.1-1: Processing Facility Components

1. Perimeter Fencing	
2. Guard House	
3. Road Network	
4. Storm Drainage System	
5. Cannery Building	a. Fruit Receiving
	b. Preparation Area

	c. MSBT Mezzanine
	d. Cookroom
	e. Can plant
	f. Packaging
6. Warehouse Area + Loading Docks	
7. Cold Storage + Loading Docks	
8. Utility Building	
9. Pavilion Building	a. Canteen
	b. Prayer Room
	c. Changing Room
	d. Executive Office
	e. Office Space
10. Waste Water Ponds	
11. Juice Plant	
12. Changing Room	a. Changing Room
	b. Admin Office
13. Support Services Building	a. Store Room
	b. Maintenance Shops
Covered Walkway	

2.1.1 Stages of Development

The development of the facility will be done in a series of stages as described in the following section:

Stage 1:

- Construction of whole processing facility
- Complete fruit receiving with one truck or bin dumper, receiving conveyor, small flume to wash the fruit, fruit elevator with fruit washer spray, feed conveyor to the fruit graders, fruit graders, fruit accumulators with direct feed conveyor, fruit distribution merry-go-round (MGR) conveyor and truck scale system
- Install four ginacas intended for juicing. Ginacas are set for 1T, 2T, 2H and small fruits (S1T/SSIT) for juice.
- Install 2 preparation lines with slicers, handguns
- Provide space for future IQF operations
- Install four-stage juice press system (Brown pre-finisher - FMC extractor - Jonith - Jonith). 1 unit for each stage.
- Install 25-GPM 4-effect plate-type evaporator and aseptic filling system expandable to 50 gpm
- Install boiler (20,000 pounds per hour, saturated steam)

- Install RO water at 55,000 litres per hour, source would be 3 boreholes.
- Install cold storage for the juice concentrate. Expandable for IQF in the future. Cold storage turnkey from Europe
- Install 3 units 350 KVA continuous and stand by generators
- Install hydrant for fire-fighting, and sprinklers on buildings
- Construct rodent-proof perimeter fence

This stage will also include the development and installation of an open lagoon system for waste water treatment plant (WWTP) which will be a combination of settling (in the first ponds) and aerobic (in the 2 second ponds) and facultative treatment (in the remaining three ponds).

The influent biological oxygen demand (BOD) and chemical oxygen demand (COD) is calculated to be 1,800-4,200ppm and 2,400-3,500ppm, respectively. After treatment, the effluent BOD and COD will be 11-24 ppm and 26-70 ppm, respectively.

The location of the open lagoons will be on lowest elevation. The following table highlights some design specifications for the WWTP

Table 2.1-2: Waste Water Treatment Plant Design Specifications

Influent volume : 1500 m^2/day (based on wastewater volume and peak water usage)	**Area (m^2)**	**Volume (m^3)**	**Retention time, days**	**Estimated Effluent BOD per pond, mg/L**
Settling Pond A	167	300	0.4	400
Settling Pond B	167	300	0.4	400
Aeration 1	1,400	3,500	2.3	600
Aeration 2	1,400	3,500	2.3	180
Facultative 1	1,000	3,500	2.3	90
Facultative 2	1,000	3,500	2.3	45
Facultative 3	1,000	3,500	2.3	22.5

Stage 2:

- Installation of PVS/Seamer, ink jet printer, can dryer, manual brite can palletizing and cooker-cooler for various can sizes.
- Installation of manual brite can depalletizing system, roll through labeller, wrap around caser, ink jet printer and manual case palletizing and stretch wrapping for packaging
- #10 cans and #2 body lines (slitter – blank transfer system - welder – flanger/ beader/ seamer – palletizer and connecting conveyors). Purchase the can ends for seaming.
- Addition of 2 Ginacas with corresponding tables, slicers and handguns for 4 Preparation lines

- Installation of a 2 MVA transformer and substation to replace the 350 KVA Continuous Genset as the main power source once an alternate power source comes on line.

Stage 3:

- Addition of 1 unit each for Pre-finisher, Extractor, 3rd stage Jonith and 4th stage Jonith.
- Addition of 1 centrifuge.
- Addition of 2 Ginacas with corresponding preparation tables with slicers and handguns.

Stage 4:

Completion of cold fill crush line.

2.1.2 Construction Activities

Construction of the facility which will be completed in stage 1 of development (described in previous section), will include the following broad stages:

Site Preparation **–** involves land clearing and establishing the desired elevations and layout of foundation area.

Excavation **–** earthworks (removal of topsoil, digging, etc.) involving the use of earthmoving equipment to establish the outline of the structure's footing.

Gravel Base/Lean Concrete **–** formation of foundation base using gravel (100mm thickness) and concrete. Compaction of the gravel base will be done using a mechanical compactor. A 5ml polyethylene translucent vapour barrier will be included in the base which prevents humidity in the air from infiltrating the walls and damaging the structure.

Concrete Works **–** involves pouring reinforced concrete footings, slabbing, construction of retaining walls and structural framings.

- Portland cement shall be used. Concrete proportions shall be of Class "A" (1:2:4) mix. Deposited concrete shall be vibrated in place by a mechanical vibrator. Concrete shall attain a minimum compressive strength of 3,500 psi in 28 days. Slump shall be within range of 25 mm to 75 mm for footings, 25 mm to 100 mm on beams and columns while, 25 mm to 50mm on concrete slab.
- Retardation compound or equivalent shall be mixed with concrete
- Non-Chloride concrete accelerators shall be added only when necessary. Mixture ratio shall attain at least 90% of its design compressive strength after 7 calendar days.
- Water-Reduction and super plasticizing agents shall be provided specially on mass/pumped concrete.
- Water Proofing shall be added to concrete in all of the retaining walls and columns exposed to wet environment.
- Washed sand shall be used;
- Gravel shall be of acceptable quality, 3/4"dia. minimum and 1-1/2"dia. maximum.

Footings, Retaining Walls, Structural Footings and Framings and Concrete slab shall be reinforced and constructed, as per approved drawings.

Painting of Concrete Surfaces - Boysen Paint or Equivalents shall be used. Concrete Surfaces shall be neutralized, washed before an epoxy sealer coat will be applied. Two finishing coats of Acrylic paint shall be applied. Some areas may be tiled.

Clearing of The Construction Site - The contractor will ensure that the site is kept tidy and safe throughout construction and particularly on completion of all construction activities. Excavation voids and construction gaps left around the structure will be filled and compacted. The area shall be left cleared and clean after the completion of the contractual work, and shall be inspected before the contractor is allowed to leave the site.

2.1.3 Materials Standards and Specifications

Table 2.1-3 and the design specifications and construction standards of various aspects of construction.

Table 2.1-3: Materials Specifications and Standards

Parameter	PHILIPPINE DATA (Surallah, So. Cotabato)	REMARKS
Steel		
Primary steel grade, Fy	275 MPa	
Secondary steel grade, Fy	228 MPa	
Concrete, Normal weight		
Compressive Strength, Fc'	20.7 MPa (min)	ACI standard
Curing period	28 days	ACI standard
Unit weight, concrete	2400 kg/m^3	ACI standard
	Non air-entrained	
Geotechnical Data		
Soil Bearing Capacity	230 kPa	
Subgrade Modulus	50-100 tons/ft^3	
Depth of water table	9.0 m	
Unit weight, soil	2247 kg/m^3	
Angle of internal friction	-not specified-	
Founding depth	1.5m (min)	
Weather profile		
Rainfall intensity	150 mm/hr	Moderate to Heavy rainfall
Reccurence period	25 years	
Surface profile	50% permeable	sandy loam with intermittent vegetation
Sanitary Sewer		
HDPE or SS pipes	HDPE Series 3000, SST304/316	HDPE for embedded, SS for exposed
Slope	1.0% - 3.0%	0.75% accepted w/ calculation support
Water seal	high flow with sediment basket	
Floor drain	Dome type with trap seal	
Storm Sewer		
RCCP/Box Culvert		
Slope	1.0% - 3.0%	0.75% accepted w/ calculation support
Natural Ventilation	INTAKE: 4% of Floor Area EXHAUST: 200%*Intake	

Table 2.1-4: Structural Standards

Parameter		NS CP2015/MBMA/SANS10160:1-8/BS-EU:0-9
STRUCTURAL	**Live Load Definition**	
	Office	2.4 kPa + 9.0 kN
	Lobbies	4.8 kPa + 9.0 kN
	Light Manufacturing	6.0 kPa + 9.0 kN
	Heavy Manufacturing	12.0 kPa + 13.4 kN
	Access Ladders/Walkways	1.9 kPa + 1.3 kN
	Wind Load	SANS10160 Part 3:2011
		Map Options: Province + Municipality
		Basic Wind Speed: V=60 m/s, 3-sec gust
		Terrain Category: B, low vegetation
		Directionality: By Zone, +Cpe, -Cpe
		Topographic Effects: Cliffs and escarpments
	Seismic Load	SANS10160 Part 4:2011
		Ground Type: 3, Medium dense sand
		Seismic Activity: Zone 1, Natural
		Behaviour Factor, q: 4.5
		Building Type: Moment, OMRF
		Building Importance Class: II, Ordinary Bldg

Other materials to be used and their specifications are listed in Table 2.1-5:

Table 2.1-5: Materials Specification

Materials	Specifications
Structural Steel	shall conform: ASTM A36
Built-up Sections	Shall be fabricated from hot rolled steel plates conforming to ASTM A 572M Grade 345 Type 1 (or equivalent), with a minimum of yield strength of 34.5 kN/cm^2 (50 ksi). Flanges shall be welded to the web by a continuous single side fillet weld deposited by an automatic submerged arc welding process.
Hot rolled sections	Shall be mill produced according to EN 10025-2 Grade S355JR (or equivalent) with minimum yield strength of 34.5 kN/cm2 (50 ksi).
Tube sections, (used as interior columns in some Multi-Span buildings)	Shall be mill formed steel sections conforming to EN 10210-1 S355J2H or JIS 3466 STKR 490 (or equivalent), with a minimum yield strength of 32.5 kN/cm2 (47 ksi).
Secondary members (comprised mostly of purlins & girts)	Shall be cold-formed from hot rolled steel coils ranging in thickness from 1.5 mm to 3.0 mm for "Z" shapes, and in 2.0 mm and 2.5 mm for "C" shapes (lipped channels).

Materials	Specifications
Painted secondary members	Shall be cold-formed from hot rolled steel coils conforming to ASTM A 607 Grade 50 or ASTM A 1011M HSLAS Grade 340 Class 1 Type 1 (or equivalent) having a minimum yield strength of 34.0kN/cm2; and then factory painted with specified Steel standard primer.
Galvanized secondary members	Shall be cold-formed from steel coils conforming to ASTM A 653M Grade SS 340 Class 1 (or equivalent), with zinc coating to Z275 (G 90) designation (275 g/m2), having a minimum yield strength of 34.0 kN/cm2 (50 ksi).
Bracing cables	Shall be 12 mm diameter, zinc coated 7-wire strand steel cables of extra high strength. The strand wires shall conform to ASTM A 475 (or equivalent) with a minimum breaking load of 119.7 kN.
Bracing rods	Used in sidewalls of building supporting cranes shall be solid plain round steel bars conforming to ASTM A 36M (or equivalent) with a minimum tensile strength of 40 kN/cm^2 (58 ksi).
Structural Steel Tubing	Shall conform: ASTM A500, Grade B
Steel Pipe	Shall conform: ASTM A53, Grade B
Bolts, Nuts and Washers:	a. High-strength bolts, including nuts and washers: ASTM A325 b. Bolts and nuts, other than high-strength: ASTM A307, Grade A c. Plain washers, other than those in contact with high-strength bolt heads and nuts
Stainless Steel Material	shall be Type 304
Concrete	Shall be of class A (1:2:4 mix). Shall attain a minimum Compressive Strength of 3,500 psi in 28 days
Plastering mortar	(10 mm minimum thickness) shall be of 1 part cement to 2 parts Screened sand work to a smooth finish
Reinforcing bars	Shall conform to ASTM A615 as specified in the drawings
Sheeting	Roof and Wall panel shall be roll-formed from 0.5 to 0.6mm (nominal) thick cold-rolled steel coated with an Aluminium - Zinc alloy. The material shall conforms to ASTM A 792M SS Grade 340 Class 2, with metallic coating AZM150 or equivalent, having a minimum yield strength of 340 Mpa (50 ksi).

2.1.4 Ancillary Facilities during Construction

2.1.4.1 Construction Base Camp

The contractor will establish a main construction base camp and may also establish smaller advance camps if necessary along the proposed access road construction route.

When the construction works have been completed, base camps and other areas used temporarily by the contractor, will be decommissioned, involving the removal of all structures, equipment and machinery.

2.1.4.2 Water

Water for construction will be sourced from boreholes. Water management schemes will be used to ensure that minimal water is used during this phase. Where possible, water will be re-used, for example to water the site during land preparation stage in order to minimise dust.

2.1.4.3 Electricity

Diesel generators will be used during the construction phase to provide lighting at the construction camp, and electrical charging facility for equipment and machinery as needed.

2.1.4.4 Fuel

Fuel for vehicles and machinery will be source from the nearest local fuel outlet, and stored in drums at the construction site. A designated area will be cleared for the drums, which will be regularly inspected for leaks and spills. On completion of the construction phase, any soil contaminated by fuel will be cleared away for disposal.

2.1.5 Waste Management

Waste generated during this phase will typically consist of domestic (including waste water / sewage) and construction type wastes.

2.1.5.1 Construction Wastes

Construction wastes will include waste materials from construction activities, and may consist of unusable / excess soils, scrap materials (wood, metal, etc), packaging (cement bags, cardboard, plastics, etc), and excess materials (e.g. concrete). The following principles will be applied in the management of construction wastes:

- Waste avoidance: Minimising the amount of material that needs to be generated and managed from the design stage. This will be done through careful calculation of materials needed to prevent unusable leftovers;
- Resource recovery: Where excess material is generated (e.g. excavated material, cement, sand, etc), options for re-using the material onsite will be looked into. If there

are no options for re-use on site, re-use in other locations will be looked into, to minimise wastage and waste generation.

- Disposal: Disposal is the last and least preferable management option to be considered. Construction wastes/materials which cannot be re-used, will be stored in a designated waste dump area within the facility.

2.1.5.2 Domestic Waste

Domestic waste will be managed through the provision of suitable waste bins at various locations within the construction camp. Wastes will be segregated at source, and separate bins provided for the disposal of food, plastics, cans, etc.; this will make it easy to sort waste into what can be re-purposed, composted, donated to communities (e.g. food waste to local piggeries) as the case may be. Domestic wastes which cannot be salvaged, will be disposed of in a designated waste dump area of the facility.

Wastewater will be generated, including sanitary wastewater, equipment wash water and storm-water runoff. Sanitation facilities (toilets/showers) will be set up for workers and will cater for sewage management.

2.1.6 Occupational Health and Safety

The safety of construction workers is of paramount concern, and it is STL's overall responsibility, and the contractor's direct responsibility for ensuring that the working conditions on site are conducive at all times. The following are some considerations that will be taken to ensure worker OHS.

2.1.6.1 Training and Supervision

The contractor shall ensure that no person is employed on any operation unless:

- The person has sufficient knowledge of and experience in the type of operation being conducted; or
- The person is being adequately supervised and trained by a person with sufficient knowledge of and experience in the type of operation being carried out and the person has been adequately instructed as to the dangers likely to arise in connection with that particular quarrying operation and the precautions to be taken against those dangers.

2.1.6.2 Machinery and Equipment

All equipment, machinery and tools used in the construction activities shall be maintained to be in a safe condition.

All elevated platforms, walkways, and ladder ways shall be provided with adequate handrails and kickboards, unless otherwise proved.

Machinery shall not be cleaned or oiled manually while it is in motion, unless the oiling points are completely guarded from all moving parts.

No worker shall drive or operate any vehicle or machinery unless:

- He / she is the holder of a current appropriate motor driver's license, and
- He / she has demonstrated to the manager or to some competent person appointed in writing by the manager, by a thorough practical test, their ability to drive / operate vehicles / machinery and that they have the manager's written authority to do so.

At the commencement of each shift, the controls and safety attachments of vehicles / machinery shall be examined by the operator, who shall immediately report any defect to the project manager.

2.1.6.3 Personal Protective Equipment

The contractor shall supply to each construction worker Personal Protective Equipment (PPE) including hard hats, safety boots and reflective vests. Where required for specific jobs, safety gloves, safety goggles, dust masks and hearing protection will be provided.

2.1.6.4 Working at Heights

Every worker, working at a height greater than two metres above the ground surface, shall be attached at all times to a properly secured stationary object by means of a safety belt or harness.

2.1.6.5 Confined Space Entry

Every worker who descends into any cavity shall be attached at all times to a properly secured safety rope by means of a safety belt or harness. When entering an enclosed space, every worker shall at all times be attended by a second person.

2.1.6.6 Exposure to Chemicals

Chemicals and hazardous substances utilised during the construction phase will be subject to precautions of use and protection as specified by the relevant Safety Data Sheets (SDS's) and shall be stored and disposed of in a manner consistent with SL regulations. If no approved disposal facility is available, such chemicals and hazardous substances will be appropriately stored (adequate building, security, prevention of rainwater ingress, etc.) until such a time when suitable disposal methods become available.

2.1.6.7 Suppression of Dust

The Contractor shall make provision for preventing or minimising dust and its related health and safety impacts. The provisions shall be such as to supress the dust by the use of water delivered from sprays or jets or other effective methods.

2.1.7 Community Health and Safety

During construction several community health and safety issues are likely to arise including:

- Increased traffic (movement of vehicles and machinery) in the host and surrounding communities, which will increase the probability of road traffic accidents;

- Dust generation from increased vehicular traffic, especially along the access road which will pose a threat to the health of the community members;
- Influx of construction workers and job seekers could result in the spread of diseases, including Sexually Transmitted Diseases (STDs) and HIV/AIDS;
- Influx of the people into the affected communities may encroach on the limited socio-economic facilities in the affected communities, thus placing additional strain on socio economic infrastructure and services, and
- Increased noise levels due to the increased movement of construction trucks, machinery and equipment in communities.

The addendum to the Environmental and Social Management Plans (ESMP) outlines mitigation measures for construction-related community health and safety issues.

The Community Development Action Plan (CDAP), one of the management plans of the ESMP addendum, includes a programme and budget to support community initiatives which will help mitigate CHS issues and grievances that may arise.

The Public Consultation and Disclosure Plan (PCDP) produced in the original ESMP to which this study is an addendum, requires regular meetings with and awareness / sensitization programmes for communities on issues pertaining to their health and safety, and remains relevant to the processing facility's development.

2.2 Operations Phase

The operations phase will involve canning and processing of fruit grown on the STL plantations. Table 2.2-1 presents estimated fruit tonnages and processed (juice or solid) produce.

Table 2.2-1: Projected Annual Tonnages and Processing Volumes

Annual tonnage, short tons		Potential recovery
Year 1	10,000	41 stdcs/ton[1], all juice
Year 2	15,000	22 stdcs/ton, juice
		28 stdcs/ton, solid
Year 3	25,000	22 stdcs/ton, juice
		28 stdcs/ton, solid
Year 4	45,000	22 stdcs/ton, juice

[1] Standard Case per ton

Annual tonnage, short tons		Potential recovery
		28 stdcs/ton, solid
Year 5	65,000	22 stdcs/ton, juice
		25 stdcs/ton, solid
		3 stdcs/ton, crush

Figure 2.2-1 and Figure 2.2-2 show the process flow diagrams for processing of pineapples into chunks and juice. Table 2.2-2 presents a description of the various stages of processing.

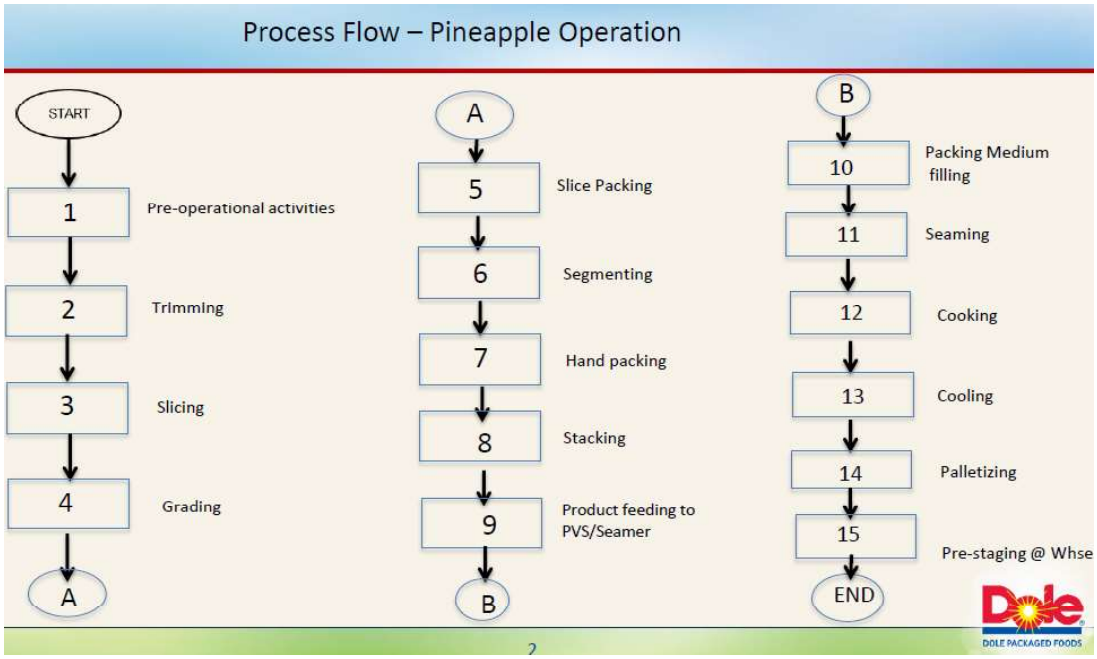

Figure 2.2-1: Process Flow Chart for Pineapple Processing

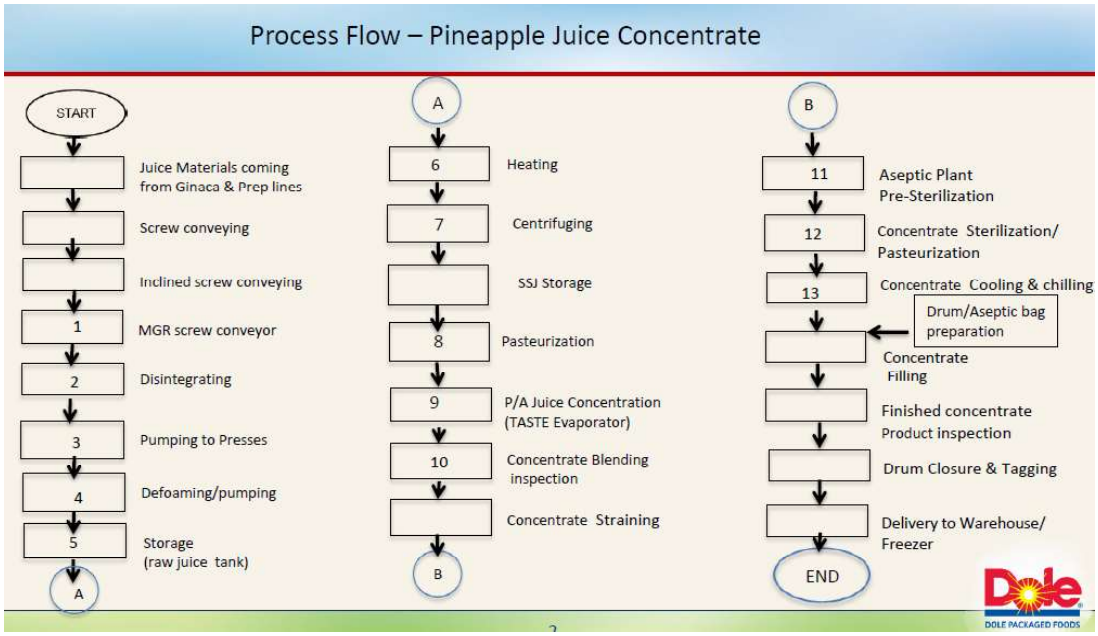

Figure 2.2-2: Process Flow Chart for Pineapple Juice Concentrate Processing

Table 2.2-2: Description of Stages of Processing

Process	Description of step
Pineapple fruit Receiving	Pineapple fruit is received from the Plantation or other farms, typically harvested in the morning. Fruit arrival and source of recorded, weighed and then sent to unloading bay for cleaning and grading. Fruit should be processed the same day as harvested.
Cleaning	Fruit moved to special wash tank filled with clean water. Pineapple fruit then taken out using conveyor.
Inspection & Grading	Pineapple fruit Quality is checked and then graded according to size by a sizing machine
Peeling & Removing Core	Sized Fruit are peeled and the core removed using a "Ginca" machine. The peeled Pineapple is then sent into the processing room. The Core and Peel are sent to the grinders and presses for the juice line.
Cylinder and Cut fruit preparation	Cylinders are inspected to remove manually residual peel/defects using a knife. The fruit then continues on to the "Slicing Machine" or "Chunk or Dicing Machine" for various cutting shapes. Metal detection in place.
Can Filling and Filling with Medium Process	The prepared cans are delivered to the different positions to receive the fruit. Fruit slices and other cuts are placed manually inside the can and then brought to Juice/Medium filling machine. The selected filling medium is prepared separately and filled into the can using "filling machine". All unused fruit pieces are sent to the juice line. Samples are taken on a regular basis for Quality control and analysed according to

Process	Description of step
	Specified Quality Standards. Metal detection in place.
Juice and Concentrate Preparation	All of the fruit not used in the canning process is sent to the juice line. The juice is used to make juice for filling the cans, to make juice product and to make concentrate of 62 brix. See section below on the juice line. Samples are taken on a regular basis for Quality control and analysed.
Sealing and Steam flush	Filled cans with pineapple are then sent to the Seaming machine for sealing, the top of the filled can is flushed with steam just before the lid is dropped on and the can is hermetically sealed. This is to create a vacuum state.
Sterilize	Sealed cans are called "brites" they are then sterilized in the "Sterilization Machine" a hot water bath, temperature to obtain is 71.1 degrees C. The water is heated with steam that comes from the steam plant.
Steam applications	Steam is used in several points in the Process. Can flushing, the Hot water bath, in Medium and Juice preparation and in the Concentration process. See Separate note below on steam generation below.
Cooling & Drying	Sterilized cans will then be conveyed to the cooling bath, they will be cooled down to a temperature of 40- 44°F and then they are conveyed to the packaging area, the Brites are air dried using a "blower" on the conveyor. Then the Brites are coded with an ink jet printer for Identification on the conveyor. The vacuum state of the can is checked.
Storage	The Brites are palletized and stored in ambient for two (2) weeks maximum to ensure products stability and to ensure they are free from contamination from microorganism during processing and operation. Quality control check points and samples taken.
Packaging	Once the Brites are inspected and approved for delivery the Brites are sent to the packaging line, the can will be labelled per market requirement, packed in different formats of size and quantity in a cardboard box (casing) per the product specification. Cases are palletized, labelled. Pallets may be stretched wrapped (Plastic) per customer spec. The Finished product is now palletized for storage and delivery to the Finished goods warehouse. Stored in ambient until it is loaded in the Export container. The finished goods may be exported on an approved pallet per USA or EU standards or transferred to a Heavy paper Slip-sheet in the container. That choice is a Customer specification. Quality control check points for proper labelling and ID are done and samples taken.

Process	Description of step
Secondary and Parallel Processes	
Can making	The can body will be made in the factory, Steel sheets and the can ends for the body will be imported, the sheets will be transformed into round can bodies in the processing plant, using 2 lines, each one for a specific can size. The can bottom will be sealed on at this stage, the top end or lid is sealed on later as stated above in the seamer stage. Cans are rinsed and inspected before delivery to the filling station.
Steam Generation	Steam generation is with a 6 ton Boiler located outside the plant. The energy source will be either electrical (using the proposed Hydroelectric dam) or fuel, (Diesel). The Steam is piped to the processing facility and distributed to the different processes where it is required, can flushing (Seamer), the hot water bath (Sterilization) and the juice/medium and concentrate process, (Heat treatments and the Evaporator)
Juice and Concentrate	All of the unused fruit is sent to the Juice line, The fruit is ground and pressed and screened. The juice is used to make juice for filling of the cans, to make juice product in cans and to make concentrate of 62 brix. Juice – The juice is collected in a batch tank, flash pasteurized, then piped back to the Filling machine to fill fruit cans and/or to fill cans of juice only. Concentrate - The remaining juice is sent to a tubular evaporator for concentration. In several stages the juice is concentrated from the original entry Brix of 13 to 62 it is then sent to a tank for holding and blending, from that tank it goes to the filling station. The Concentrate can be filled into a 225 litre barrel or a Larger Bag in Box, both have a plastic liner and bag with a seal to receive the concentrate. The containers are then labelled and palletized. They are either stored in ambient or in the freezer depending on customer/market requirements. Then loaded in container/truck for delivery to port and then to Export Market
Pineapple waste	All of the pineapple residue from the Juice process is collected in a hopper and transferred to a truck, this waste can be used in several ways. Pineapple residue can be used as an animal feed, this is a market to be developed with small farmers for cattle and other ruminant's production. It will be sent to a composting station for conversion into a compost which is then used as a soil additive to improve soil structure and organic content, the compost is then delivered to the fields during the land preparation stage prior to planting the new cycle. The residue is spread directly on Pineapples fields that are in their fallow cycle, the decomposition will take place in the field and it will be

Process	Description of step
	incorporated into the soil at the time the field is prepared at the end of its fallow cycle, Minimum fallow time is 90 days but can go for 120 days or more.
Quality control and analysis	At several points in the process inspections and verifications are done, samples are taken on a regular basis for verification of the fruit, the cut, the selection packed, the juice, the medium, verification of the Heat and cooling treatment, and the stability in the final storage period, finished cans are sampled and keep for reference to daily production. All of the analysis is done in the quality control Lab with the appropriate equipment and procedures for product control and documentation.
Cleaning process	During the day spot, pipe and floor rinsing may take place in different processes. At the end of the shift the entire processing plant will be cleaned, all of the working surfaces, the equipment in and out, CIP will be used in all the piping system and tanks that store or moves juice or concentrate.

2.2.1.1 Water Supply

Boreholes will be sunk near the facility, 2 to 3 depending on yield. The water will be stored in a large water tank and treated for use in the cannery and the steam process. The water tank will also serve as the reserve for fire-fighting per insurance requirements.

2.2.1.2 Power Supply

A 2MVA transformer and substation will be installed. Once an alternative main power source is obtained, it will be linked to the transformer and substation for distribution to the facility.

There are however plans to look into other more environmentally friendly sources of energy as the project progresses. Options include hydropower, solar power, and the use pineapple/fruit waste to produce methane gas. Methane gas production would require a sufficient amount of biomass available on a regular basis to sustain energy production. This could be a possibility after 2023.

2.2.1.3 Waste Management

The main types of waste expected to be generated from the project during operations include domestic waste, process wastes and sewage. The handling of domestic wastes and sewage have been discussed in the main ESIA report and the Waste Management Plan in the ESMP report. The following sections therefore discuss solid and liquid process wastes.

2.2.1.3.1 Process Waste (solid)

Process wastes include parts of the fruit such as peels, pods, seeds, skins, etc., and can account for about 10–60% of the total weight of the fresh produce. Improper handling of these wastes poses increasing disposal and potentially severe pollution problems. Due to the typically significant presence of cellulose, hemicellulose, pectin, minerals, vitamins, and low lignin content, this waste offers a huge potential for conversion into biofuel (Dhillon et al., 2016).

Initially however, agricultural and process waste will be mulched and incorporated back into the soil to improve its organic material content.

2.2.1.3.2 Process Water

All of the water from the daily cleaning/rinsing processes and the end of shift cleaning process will be collected and sent to the treatment lagoons. There are 3 stages with 7 basins, 2 settling ponds, 2 aerated lagoons and 3 facultative lagoons. Water quality will be monitored at each step, water quality at the end of the process and at release will meet WB effluent standards. There are future plans for an additional large basin will be added at the end to collect and store all the water released to be used as irrigation water or recycle it back to the plant water treatment plant.

2.2.1.4 Occupational Health, Safety and Security Issues

Dole is committed to providing its employees with a safe and healthy work environment. This includes providing appropriate protective equipment, as well as following good manufacturing practices and taking proper safety and sanitation measures. By complying with applicable environmental and occupational health and safety laws and regulations, a safe working environment will be ensured.

In order to uphold the Company's commitment to a safe and healthy workplace, management and employees will be required to:

- Follow all safety laws and procedures
- Observe posted safety-related signs
- Use prescribed safety equipment whenever required

Management and staff will be required to work together to prevent hazardous or unsafe working conditions. Each staff will be responsible to follow prescribed safety and reporting procedures if any hazardous conditions or unsafe behaviour is detected.

Use of alcohol and illegal drugs will not be accommodated and employees will be prohibited from possessing, distributing, selling or using these items while on the Sierra Tropical Premises.

To further ensure a safe work environment, acts or threats of violence will not be tolerated. Any threatening behaviour will be addressed immediately with utmost seriousness. Weapons will not be permitted on the premises.

2.2.1.5 Environmental Health and Safety

It is STL's policy to comply with all applicable laws and regulations at all times and to take all practicable steps to promote health, safety and environmental protection. STL's parent company, Dole, manages operations worldwide that belong to different economic sectors – farming, food processing, manufacturing, research, transportation (including trucking, shipping and managing port facilities), distribution and sales. In all these operations, it is Dole's goal to prevent adverse effects on health, safety and the environment and subsidiaries are required to operate within the same standards.

Dole strives to develop and employ approaches that are most appropriate and effective under local conditions and are guided by: scientific research and knowledge; principles of risk analysis; public, community and worker concerns; and regulatory policies and standards of Japan, the U.S., the European Union and international organizations such as the World Health Organization.

Dole's farming operations utilise sustainable agricultural practices and integrated pest management methods that employ biological and agricultural approaches to controlling pests and plant diseases. Crop protection products are used only when and where necessary, and always with the proper care and in accordance with applicable laws. Dole and its subsidiaries will not use any product banned for reasons of unacceptable health or environmental risk by the United States Environmental Protection Agency, Japan or the European Union.

3 ANALYSES OF PROJECT ALTERNATIVES

In accordance with current ESIA good practice, it is appropriate for the study to review alternatives considered during planning of the project, and to explain why the proposed project activities have been selected, including potential environmental, social and advanced technological considerations.

3.1 The "No Project Option"

The processing aspect of the STL agro-processing operations brings another layer of benefits to the agricultural aspect of the project. Sierra Leone does not have many manufacturing outfits, and relies mostly on the export of our raw materials to other parts of the world for processing.

The option of processing the fruits brings with it several benefits at local and national levels including the following among many others:

- Employment and skills training in a niche area of production (fruit processing).
- Export of locally produced and manufactured goods and presence of made in Sierra Leone products on the international market.
- National revenue generation

3.2 Choice of Location

The location for the cannery was chosen based on a number of criteria including technical and economic considerations. Agro-processing industries usually take the market location and proximity to raw material as the primary considerations for selecting a location for their processing facilities (Turan, Ozbag and Cetin, 2007).

Other factors taken into consideration include adequate supply of good water, availability of manpower, proximity to road transport facilities, etc.

3.2.1 Proximity of Raw Materials - Fruit

The basic objective of choosing a suitable plant location is to minimise the average production cost, including transport and handling. It is also advantageous to locate a processing plant near the fresh raw material supply to ensure proper handling of the perishable raw materials. This includes allowing raw material (fruits) to reach its best stage of maturation, and also lessens the likelihood of injury from handling and deterioration between harvesting and arrival at the processing facility.

The processing facility will be located within the Lugbu Chiefdom, where the initial fruit plantations have been established. Transportation of fruits to the processing facility, will

require minimal handling of fruits and transportation costs relative to other locations outside this chiefdom.

Although the project is likely to spread to other chiefdoms in the future, it makes the most economic sense for the facility to be established within the start-up chiefdom.

3.2.2 Market Accessibility

The choice of location also takes into account accessibility to the local market, as well as ease of transportation for export. The route to and from the facility bye-passes major communities, including the chiefdom headquarter town of Sumbuya. The rationale for this is that it would be safer and less intrusive on local traffic, if the trucks transporting the goods from the facility did not have to pass through major town centres where they could negatively impact on human and vehicular traffic conditions.

An access road will be created to facilitate the ease of movement of goods from Benduma Sewa into Bo and onwards to export destinations, without having to pass through Sumbuya.

3.3 Project Technology & Operations Option

The project technology and operational model to be implemented has been chosen due to its effectiveness in other areas of the world where Dole operates.

Dole pineapple operations today currently operate Processing Facilities in the Philippines and Thailand. This operation is modelled on the Dole Philippine (DoleFil) operation for Fruit production and Processing, where there are two processing centres. The basic design of the facility in Sierra Leone is closely based on the latest expansion of the 2nd facility in Dolefil, both of which are operating successfully. The Dolefil engineering staff which produced the plans for STL are experienced and have just completed the expansion of the second site and therefore have all the knowledge and expertise fresh in their minds as they have built STL's plans while executing the construction of the new expansion in Dolefil. The technology being used is tried and proven with many years of current operation and is constantly updated to meet the strict requirements of the Market and Dole's Quality standards which is reflected in our operating model.

4 Policy, Legal, Regulatory and Institutional Context

During the main ESIA study covering the development of the agricultural aspects of the first two phases of the STL project, several laws, policies and plans were discussed, as well as the Institutional bodies with influence on a project of this nature. This section discusses the legislative and institutional context specific to a construction project and factory-type operations.

4.1 Policies and Plans

The following policies and plans, relevant to an agricultural project as a whole, were discussed in the main ESIA report:

- National Environmental Policy (1994);
- Agriculture Policy (2009);
- National Land Policy (2015);
- Forest Policy (2010);
- National Biodiversity Strategy and Action Plan (2003);
- Conservation and Wildlife Policy (2010);
- Disaster Management Preparedness Plan (2006).

Policies with a bearing on the implementation of this project are discussed in the following sections.

4.1.1 The National Employment Policy and Action Plan, 2015

The Sierra Leone National Employment Policy and Action Plan (NEP-AP) sets out the principal employment strategies for 2015 to 2018. The policy document is based on consultation within and beyond government, and is intended to catalogue measures identified as important by key stakeholders in the labour market. The document is intended to serve the needs of Employers, Employees, jobseekers and groups facing labour market barriers.

The Action Plan, which is to be reviewed and updated annually, includes specific actions for both short-term and medium to long-term interventions. Those relevant to the STL project include:

- All major infrastructure public works projects should have employment conditionalities built into them, including a requirement to employ workers from the local areas
- Revive and create job centres at regional/district levels, managed and supervised by the Ministry of Labour and Social Security, to match demand and supply of labour
- Enhance labour market opportunities for young people in agriculture and agribusiness, and support the reintegration of unemployed and underemployed youth living in urban centres in new employment opportunities at the district level.

- Promote the use of local materials, goods and services and low-cost appropriate technology in production activities and development projects, as consistent with the new Local Content Policy, to promote local employment and create sustainable market linkages between the informal and formal sectors

4.1.2 The National Energy Policy, 2009

The National Energy Policy serves as a Policy instrument for the development and more efficient management of the country's energy sector. The main goals of the Policy are as follow:

- To produce on a sustainable basis, adequate modern energy supply to meet the development aspirations of the country;
- To provide electricity at affordable prices everywhere in the country;
- To ensure uninterrupted supply of petroleum products throughout the country at affordable prices;
- To provide environmentally friendly, affordable household energy on a sustained basis, and
- To develop indigenous fossil and renewable energy sources for the country.

This policy and projects which may be implemented to meet its objectives, may contribute positively to the energy requirements for the operation of the facility. Similarly, STL may look into the opportunities available to work with GoSL on energy generation, particularly when the time for the consideration of renewable energy options are being considered.

4.1.3 National Road Safety Policy, Strategic Plan and Trust Fund, 2013

The overall objectives of the policy are:

- To reduce the number of accidents, fatalities and injuries in road traffic;
- To put in place effective road safety management and coordination functions;
- To bring in place the necessary legal, policy, administrative and financial foundation for road safety interventions;
- To bring into place cost effective road design and maintenance procedures that consider all road users, minimise road user error (self-explanatory roads) and produce a more forgiving roadside;
- To improve safe road user behaviour through increased awareness of traffic regulations and accident risks, and
- To improve the competence of drivers and in particular to produce safety conscious drivers through training and testing standards.

The project involves the improvement of an access road to the processing facility, which may result in higher and unfamiliar traffic conditions for residents in the surrounding communities. In support of this policy, STL will contribute to the road safety sensitization and awareness raising aspects, ensure the competence of their drivers along the new access

road, effect regular grading and maintenance of the road, etc. Implementation of this policy, could possible result in the development of more roads within the project area.

4.2 Legislation

The following acts have been discussed in the main ESIA for this project:

- *Sierra Leone Environment Protection Agency Act (2008 / 2010);*
- *The Forestry Act (1988);*
- *Land Tenure and Ownership*
- *Fisheries Act (2007);*
- *Wildlife Conservation Amendment Act (1990);*
- *Factories Act (1974)*
- *Local Government Act (2004)*

Legislation related to the specific development activities discussed in this addendum are discussed in the following sections. The Factories Act of 1974, is of particular relevance to the processing facility, and is discussed again for emphasis.

4.2.1 Factories Act, 1974

This Act became effective on the 30th May, 1974. It basically deals with health and safety measures as they concern the factory worker. It protects the worker through demands for all aspects of cleanliness, reports of all injuries, accidents, diseases and death.

Rules for the Implementation of the Act

As stated in section 16, the Minister may make rules for the effective implementation of this Act and such rules may provide:

- For the safety of persons employed in such trades and occupations as may be declared to be dangerous trades;
- For imposing obligations for the better safeguarding of persons against accidents from dangerous parts of any machinery;
- For the construction and maintenance of fencing to the dangerous parts of any machinery;
- For the proper maintenance and safe-working of raising and lowering machinery;
- For prescribing the qualifications to be possessed by engineers and other persons, for them to be placed in charge of, or entrusted with the care or management of any specified machinery;
- For the reporting of any occurrences at any works arising from, or in connection with, the use, maintenance or repair of any machinery;
- For the appointment of persons to hold enquiries under this Act, and prescribing powers and duties of such persons; and

- For the fixing of penalties not exceeding a fine of one hundred Leones or imprisonment for a term of six months or both such fine and imprisonment, for the contravention of any rule.

Offences and Penalties

Part VIII of this Act emphasizes on offences, penalties and legal proceedings. Section 47, subsection 1 of this part, states that in the event of any contravention of the provisions of this Act or of any Regulation or Order made there under, the occupier or owner of the factory, shall, be guilty of offence under the Act.

Regarding offences for which there are no penalties provided, section 48 stipulates that, any person guilty of an offence under this Act for which no express penalty is provided by or under the Act, shall be liable to a fine not exceeding fifty Leones or to imprisonment for a term not exceeding one month or both. If the contravention for which he was convicted continues, he shall be guilty of a further offence and liable to a fine not exceeding ten Leones for each day on which the contravention is continued.

Section 50 states that if anyone is killed, or dies, or suffers any bodily injury, in consequence of the occupier or owner of a factory having contravened any provision of this Act, the occupier or owner of the factory, shall, without prejudice to any other penalty, be liable to a fine not exceeding two hundred Leones or to imprisonment for a term not exceeding three months, or to both.

All offences committed under this Act shall, as section 56 states, be prosecuted in a magistrate court.

Powers of Inspectors

Section 14 of part IV of this Act states that an inspector shall, in executing this Act, have the power to do the following:

- To enter, inspect and examine a factory and its environs at any time, as long as he has reasonable cause to believe that explosives or any highly inflammable materials are stored or used;
- To take with him during an inspection, a police officer, if he has reasonable cause to expect any serious obstruction during the execution of his duty;
- To require the production of all documents and to examine and copy them in pursuance of this Act;
- To make necessary inquires and examinations to ascertain whether the provisions of the Act are complied with; and
- To prohibit the use of any machinery, if he is reasonably of the opinion after examination, that it is not in good and safe condition.

If anyone wilfully delays or obstructs the Inspector in the exercise of any of his duties under this Act, then such a person shall be guilty of an offence and be liable to a fine not exceeding twenty Leones or to imprisonment for a term not exceeding one month or both. The occupier of the factory shall also be guilty of such an offence and be liable to punishment in like manner, even though he has not personally caused the obstruction.

Safety, Security and Welfare of Employees

Part V of this Act, deals with the aspect of health and stipulates that every factory shall be kept in a clean state and free from effluent arising from any drain, sanitary convenience or nuisance. This part of the Act also states that for overall safety of all employees, the factory must not be overcrowded, must be effectively ventilated, and provided with suitable lighting systems. Every care must be taken by the factory holder, to secure the health, safety and welfare of all employees.

As indicated in section 38, it is incumbent on the company to notify the District Inspector, in writing, of any accident or death in the factory. It is also stated in section 39 that all factory contracted diseases identified by a medical Practitioner, must be brought to the notice of the Chief Inspector in Freetown.

Section 40 states that: Where injury immediately results in death, the site of the accident must be left undisturbed after the removal of the corpse, until inspected by a police officer or an inspector.

On receipt of the report of an accident, the inspector shall if he considers it necessary or if directed by a higher authority immediately proceed to the scene of the accident, as indicated in section 41, and shall make enquiry into the cause of the death. This section further states that for the purpose of this enquiry, the inspector is free to use any one under oath, any document, and award fees for giving evidences, as may be fixed by the minister.

Any person, who, without reasonable cause, fails to comply with the terms of summons of the inspector, or refuses to be examined or to answer questions other than that which may incriminate him, or anyone who obstructs an Inspector or any person acting under his directions in the execution of his duty under section 41, shall be guilty of an offence.

The owner of every factory, according to section 45, must within 24 hours report in writing to an Inspector every dangerous occurrence caused by any machinery or electrical abnormality.

Section 26 of part VI stipulates that there shall be kept posted in a prominent position in every factory:

- The prescribed abstract of this Act;
- The address of the Chief Inspector and of the nearest Inspector; and
- Printed copies of any regulations made under any part of this Act which are for the time being in force in the factory; or the prescribed abstracts of such regulations.

4.2.2 The Sierra Leone Local Content Agency Act, 2016

The Act establishes the Sierra Leone Local Content Agency to provide for the development of Sierra Leone Local Content in a range of sectors of the economy such as industrial, manufacturing, mining, petroleum, marine resources, agriculture, transportation, maritime, aviation, hotel and tourism, procurement of goods and services; public works, construction and energy sectors; to promote the ownership and control of productive sectors in the economy by citizens of Sierra Leone. Prime objective of the Agency is to promote Sierra

Leone local content development by effectively and efficiently managing the administration and regulation of Sierra Leone local content development in Sierra Leone.

The Act makes provision for a Sierra Leonean Content Plan to be produced from companies like STL operating in Sierra Leone, to demonstrate compliance with the local content policy requirements. The Plan must indicate "how an operator gives first consideration to Sierra Leonean companies, materials, goods and products, including specific examples showing how first consideration is considered and assessed in evaluation of bids for materials, goods and products required by the project, operations or activity."

4.2.3 The Sierra Leone Roads Authority (Amendment) Act, 2010

The Sierra Leone Roads Authority (Amendment) Act of 2010, provides for the establishment of the Authority. The object for which the Authority was established was for the control, development, maintenance, efficient planning and reliable management of the national road network to provide safe, reliable and sustainable means of transport.

The following are some of the responsibilities of the Authority among others:

- develop a national policy on the maintenance, rehabilitation, improvement and management of the national road network and exercise control over its implementation;
- specify the national road network and determine a functional classification scheme;
- set the width of the right-of-way for roads which form part of the national road network;
- develop technical instructions and standards on roads forming part of the national road network;
- commission engineering, traffic and economic studies for the maintenance, safety and improvement of the national road network;
- propose vehicle weight and dimension limits for the protection of roads, bridges and ferries and ensure their enforcement in collaboration with the relevant enforcement body;
- Provide technical guidance and support to local councils in the maintenance of roads devolved to them under the Local Government Act, 2004;
- Support specialist road related training organized or provided by anybody or person;
- commission applied road related research;

STL will need to seek the involvement of the Sierra Leone Roads Authority in the development of the access road, for technical guidance and support, and to ensure that relevant instructions and standards are met.

4.2.4 National Water Resource Management Agency Act, 2017

This is an Act to provide for the equitable, beneficial, efficient, and sustainable use and management of the country's water resources through the establishment of a National Water Resources Management Agency. It also provides for the establishment of a Water Basin

Management Board and Water Catchment Area Management Committees for the management of the water resources and for other related matters.

The National Water Resources Management Agency shall be responsible to ensure that the water resources of the country are controlled in a sustainable manner.

It is anticipated that the Agency will be developing a water resources management system, which may include licensing of large-scale water users and industries. This is likely to have an impact on the STL project. Reporting on water consumption and management measures may also be required.

4.3 Institutional Context

Government institutions with a bearing on a project of this nature discussed in the main ESIA report include:

- The Ministry of Water Resources
- The Ministry of Fisheries and Marine Resources
- The Ministry of Agriculture, Forestry and Food Security
- Ministry of Land Country Planning and the Environment
- The Environment Protection Agency Sierra Leone

Institutions relevant specifically to this aspect of the project include the following:

4.3.1 Ministry of Labour and Social Security

The Ministry oversees the employment condition of Sierra Leonean workers, with Directorates aimed at addressing:

- Policy, Planning and Research
- Labour and Employment
- Occupational Health and Safety

The ministry conducts periodic inspections, issues work permits, and addresses industrial disputes, among many other functions.

4.3.2 Ministry of Works and Public Assets

The Ministry is responsible for the construction and maintenance of all Government Buildings including the Airport. Its key functions include:

- developing regulations for buildings and civil engineering standards;
- identifying Quarrying sites;
- registration of all civil works Contractors;
- developing and implementing a National Housing Policy;
- providing housing for Public servants and low-cost housing for the communities;

- approving Building Plans and issuing Building permits;
- ensuring compliance with building regulations;
- collaborating with other MDAs/Institutions to develop a National Infrastructural Policy;
- providing professional advice to all MDAs/Institutions/Non-state involved in infrastructural development (These include for example electricity, water, sewage and sanitation);
- Providing oversight responsibilities for the Sierra Leone Roads Authority (SLRA).

Approval and technical advice will be sought from the Ministry in the development of the facility. Building permits will also be acquired.

4.3.3 The Ministry of Trade and Industry

The Ministry of Trade and Industry is responsible for promoting industrial and economic growth in Sierra Leone. It has the sole mandate of developing policies and programmes to stimulate local and export trade as well as to enhance private sector investment, industrial and economic growth.
The MTI is divided into departments set up to aid the actualisation of the Ministry's goals. These departments include:

- Policy Planning and Research
- Domestic Commerce and Industry
- Foreign Trade
- Programme Management

4.3.4 Sierra Leone Investment and Export Promotion Agency (SLIEPA)

SLIEPA is advised by a Board of Directors.

The principal functions of SLIEPA are as follows:

- To promote investment opportunities in Sierra Leone and provide information to potential investors on matters relating to investments;
- To facilitate registration of business enterprises and assist investors in obtaining permits, licenses, certificates or clearances needed for the commencement of business (that is, acting as a "one-stop" centre);
- To assist potential investors in identifying joint venture partners in Sierra Leone.
- To develop relationship between public and private sector for the growth of investment

The objectives of SLIEPA are to promote investment into Sierra Leone and promote exports of Sierra Leonean products. More specifically the agency shall:

- Encourage and promote the development of agricultural production and other activities oriented towards exports (of particular relevance to the STL project)
- Provide exporters with marketing advisory services and assist them in developing marketing plans for entering or expanding business into foreign markets;
- Identify potential investors with a view to encouraging them to invest in agriculture and other sectors of the economy, and promote both locally and internationally, the opportunities for investment in Sierra Leone;
- Collect, collate, analyse and disseminate in user friendly and accessible formats, information about investment opportunities in the economy and priority sectors in Sierra Leone;
- Facilitate co-ordination and cooperation between the public and private sectors in matters relating to investments

SLIEPA has been instrumental in the implementation of the STL agro-processing project, and continues to be a main advisory body in the project's roll-out.

4.3.5 Sierra Leone Roads Authority (SLRA)

This is a semi-autonomous institution responsible for managing and maintaining the national road network. SLRA plays a key development role by upgrading and extending Sierra Leone's road network. The Authority's vision is to provide well-maintained road access to all communities with the aim of achieving over 3,500 km of tarmac roads to major towns and communities and a network of roads connecting them.

As discussed in section 4.2.3, STL will seek SLRA's advice in the development of the access road.

4.4 International Guidelines

This section discusses the Multilateral Investment Guarantee Agency (MIGA) Performance Standards applicable to the project. Table 4.4-1 outlines the Performance Standards Triggered by this project and describes how they have been addressed in the study.

Table 4.4-1: MIGA Performance Standards Applicable to this Project

Performance Standard	Description of how it is addressed in the ESIA
PS1: Assessment and Management of Environmental and Social Risks and Impacts	• Table 7.2-6, Table 7.2-7 and Table 7.2-8 present the impacts identified and recommended mitigation measures in relation to the implementation of this project. • The PCDP in the main ESIA document provides guidelines for the development of a Grievance Redress

Performance Standard	Description of how it is addressed in the ESIA
	Mechanism. Additional guidelines are provided in the addendum to the ESMP. • The main ESMP as well as the addendum to the ESMP, forming the second volume of this ESIA addendum, describes the measures to be put in place to manage identified impacts, and assigns responsibility for their implementation.
PS2: Labour and working conditions	The following sections of this report discuss the legal and institutional framework for labour and working conditions in Sierra Leone. • Section **4.1.1**: The National Employment Policy and Action Plan, 2015 • Section **4.2.1**: Factories Act, 1974 • Section **4.2.2**: The Sierra Leone Local Content Agency Act, 2016 • Section **4.3.1**: Ministry of Labour and Social Security These will serve to guide STL in the development of their internal labour policies and grievance redress mechanisms.
PS3: Resource Efficiency and Pollution Prevention	• Sections 2.1 and 2.2 discussing the construction and operational phases of the project, include details on water and energy usage during both phases of implementation, and considerations being taken to efficiently manage their consumption levels. The sections also include details of the planned WWTP and long-term plans for reduction in the use of diesel generated electricity. • Section 2.1.5 and 2.2.1.3 discuss waste management during each phase. The Waste Management Plan (WMP), included in the addendum to the ESMP discusses waste management issues specific to a processing facility's construction and operation. • Table 7.2-6, Table 7.2-7 and Table 7.2-8 present the impacts identified and recommended mitigation measures, including those related to pollution.
PS4: Community Health, Safety and Security	• Table 7.2-6, Table 7.2-7 and Table 7.2-8 present identified impacts likely to affect community health and

Performance Standard	Description of how it is addressed in the ESIA
	safety, and include recommended mitigation measures. • The EHS plan in the ESMP discusses CHS issues and measures to be put in place to manage them; the PCDP and CDAP include guidance to ensure community consultation, grievance management and assistance throughout the project.
PS 5: Land acquisition and Involuntary Resettlement	The facility is located on land that had already been acquired during the project start-up. At this stage of project implementation, the issue of involuntary resettlement did not arise. A Resettlement Policy Framework (RPF) was however developed as part of the main ESIA study.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	An extensive ecological assessment was done of the phase 1 and phase 2 start-up area, including the current location for the facility. The outcome of this assessment can be found in section 5.2 of the main ESIA report, to which this report is an addendum. Generally, the assessment revealed that no protected areas were found within the project start-up area, except for local sacred groves generally protected by traditional bye-laws. A few endangered and vulnerable mammalian species were
PS 7: Indigenous Peoples (IP)	Not triggered by this project
PS 8: Cultural Heritage	Not triggered

5 BASELINE SURVEY AND CONDITION

The purpose of the present section is to establish an accurate baseline of the project area before the implementation of this project.

The baseline assessment was carried out on the physical, biological and social environments. Descriptions of the existing environment include primary and secondary data and information from relevant and available sources; text is illustrated with summary tables of data, maps, graphs, photographs and detailed written descriptions.

Noise, dust and wind speed measurements were taken in various locations as indicated in the following figure:

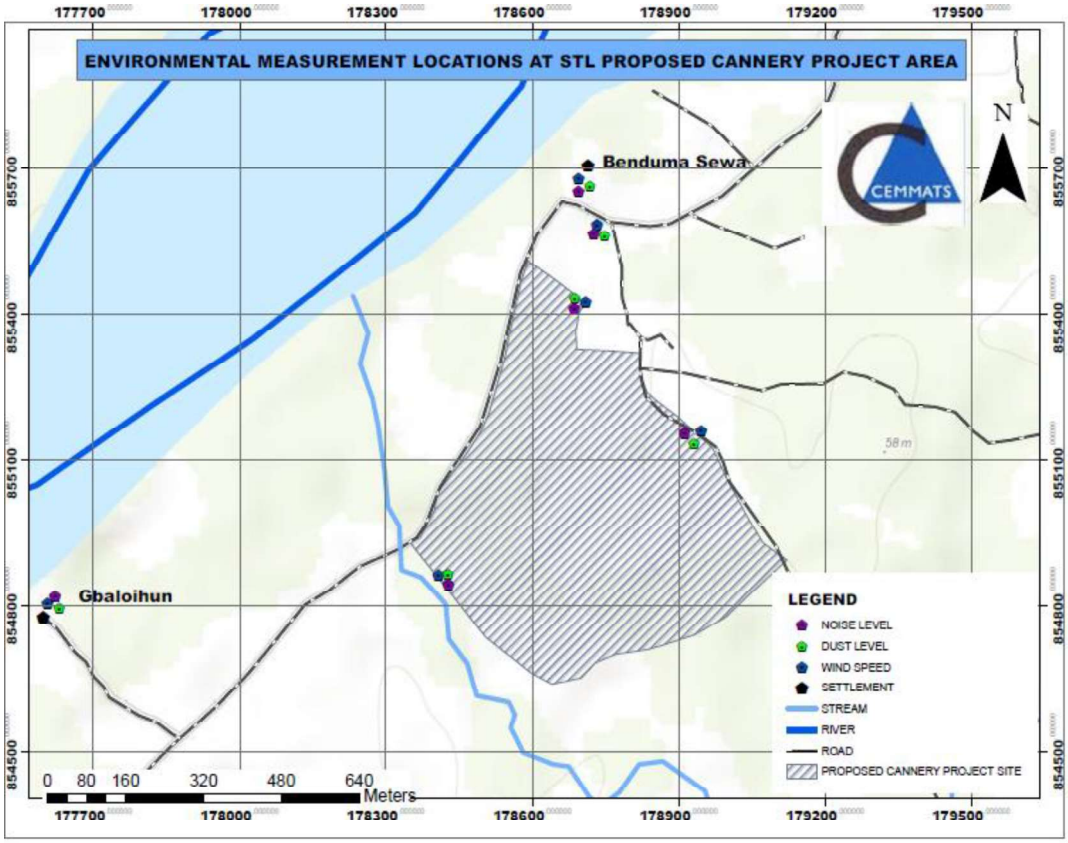

Figure 4.4-1: In situ Environmental Measurement Points

The physical environment of the project area lies within the environmental boundary considered during the original ESIA study and remains largely unchanged. The following measurements and descriptions were taken within and around the project-site and represent conditions at the time of the field assessment in December 2018.

5.1 Methodology

In-situ physical measurements were taken using handheld equipment in and around the project area. Water samples were also taken from surface and groundwater sources, which were sent for testing at the National Water Quality Laboratory in Freetown.

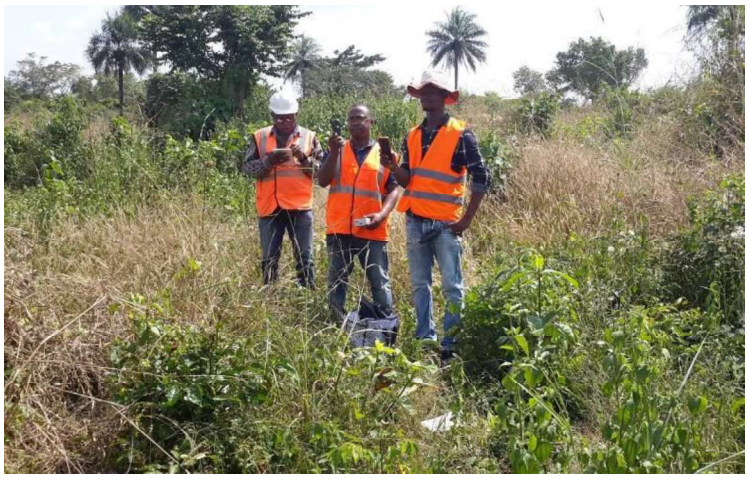

Figure 5.1-1 Above: Physical Environmental Measurements being taken on the Project Site

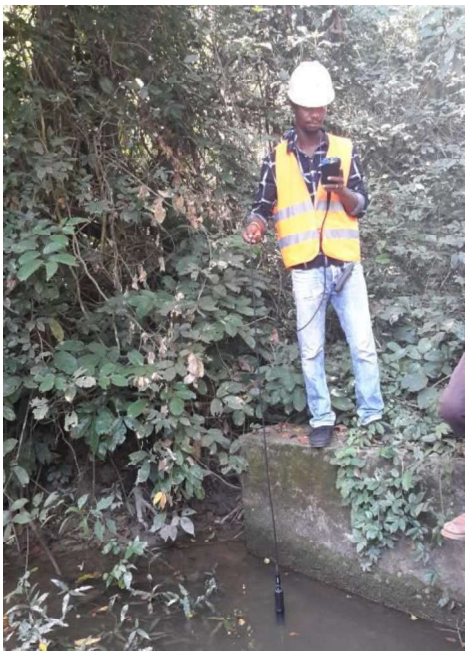

Figure 5.1-2 Right: In Situ Water Quality Measurements being taken in Beye Stream

5.1.1 Climatic Data

Measurements were taken on the relative humidity, wind speeds and temperatures within the project area on different dates and times of day as shown in Table 5.1-1.

Table 5.1-1: Climatic Data around Project Site

Location	GPS coordinates	Time	Wind Speed (m/s)	Relative Humidity (%)	Temp. °C
Aprox 300m from main road to Benduma Sewa	0178407; 0854862	11.15	0.0	72.7	31.3
Eastern edge of site boundary	0178946; 0855159	13.00	1.3	47.9	36.7
Western edge of site boundary	0178709; 0855423	13.30	1.1	42.2	40.6
Benduma Sewa (old settlement)	0178695; 0855678	11.10	0.0	61.3	34.9
Benduma Sewa (new settlement)	0178733; 0855583	11.30	0.9	52.4	35.4

Location	GPS coordinates	Time	Wind Speed (m/s)	Relative Humidity (%)	Temp. °C
Gbaloihun	0177606; 0854804	12.15	0.0	51.4	38.4

The climatic data are fairly typical for this time of year, with high temperatures particularly in the afternoon hours. Relative humidity values are average and wind speed values low, ranging between calm (0.0m/s) and light air (1.3m/s) categories (using the beaufort scale).

It must be noted that at the time of measurement, the harmattan winds, which usually start blowing during the December and early January months, had not yet started. These harmattan winds can last for up to 3 months, and are characterised by cooler temperatures, higher wind speeds and low relative humidity values.

5.1.2 Air Quality Data

The concentration of particulate matter in the air around the project area was recorded and the results presented in

Table 5.1-2: Air Quality Measurements

Location	GPS coordinates	Time	PM 2.5 Average Values (µg /m^3)	PM 10 Average Values (µg /m^3)
Aprox 300m from main road to Benduma Sewa	0178407; 0854862	11.30	31.5	44.6
Eastern edge of site boundary	0178946; 0855159	13.15	29.5	41.5
Western edge of site boundary	0178709; 0855423	13.45	28.1	39.5
Benduma Sewa (old settlement)	0178695; 0855678	11.25	33.7	46.6
Benduma Sewa (new settlement)	0178733; 0855583	11.45	27.9	39.8
Gbaloihun	0177606; 0854804	12.30	27.4	40.1

The WHO air quality standards stipulate the maximum thresholds for particulate matter as follows:

- Nuisance Dust PM10 – 50µg/m^3
- Thoracic Dust PM2.5 - 25 µg/m^3

Nuisance dust which refers to dust particles that are typically found lying on surface, and are too big to be inhaled, was found to be within reasonable limits, with no values recorded

exceeding 50µg/m^3. Thoracic dust, was however found to be quite high in all the locations measured; all measurements exceeded the recommended threshold of 25 µg/m^3.

Dust generation at the time of measurements could only be linked to livelihood activities occurring in the various communities such as movement of people on foot and bikes, sweeping, food preparation (e.g. winnowing), etc.

5.1.3 Noise Level Data

Noise levels were recorded and the results are shown in Table 5.1-3.

Table 5.1-3: Noise Measurements

Location	GPS coordinates	Time	Minimum (dB)	Maximum (dB)
Approx. 300m from main road to Benduma Sewa	0178407; 0854862	11.50	38	68
Eastern edge of site boundary	0178946; 0855159	13.45	36	73
Western edge of site boundary	0178709; 0855423	14.05	36	75
Benduma Sewa (old settlement)	0178695; 0855678	11.45	39	76
Benduma Sewa (new settlement)	0178733; 0855583	12.05	42	80
Gbaloihun	0177606; 0854804	12.50	37	75

The WHO recommends that noise levels during the day time noise levels for outdoor residential/community settings of no more than 55dB. Minimum noise levels recorded fall within this limit, however, maximum noise levels all exceeded this threshold. The maximum noise level measurements can also be attributed to day-to-day livelihood activities occurring at the times of measurement.

5.1.4 Hydrology and Water Quality

A hydrological investigation was conducted to characterize the water quality of the surface and groundwater bodies within the vicinity of the project site.

Physical water quality measurements were taken on-site, while a few sample were taken and sent to the laboratory for microbiological analysis.

5.1.4.1 Identified Water Bodies within Project Area

The communities around the project site rely mainly on the Sewa River for their water needs. The upper reaches of the Sewa River is extensively panned for diamonds, while rice cultivation dominates the area of the river closer to the shore. Benduma Sewa and

surrounding communities rely on the river for their livelihoods such as fishing, drinking, transportation, sand mining and recreation.

A hand dug well, equipped with a hand pump was also identified in Benduma Sewa, which also serves as a main water source for communities.

The Beya Stream, is another water source identified fairly close to the project site. It is a seasonal stream which runs under a bridge on the road to Benduma Sewa, and drains into the Sewa River. It is reportedly also used for drinking, bathing and small-scale fishing activities.

5.1.4.2 Water Quality Results

Table 5.1-4 and Table 5.1-5 present the water quality measurements taken of the various water sources.

Table 5.1-4: In Situ Physico-Chemical Water Quality Results

Parameters	Units	Beye Stream 0178352; 0854929	Sewa River (Benduma Sewa) 0178728; 0855862	Sewa river (Gbaloihun) 0177605; 0854853	Hand pump (Benduma Sewa) 0178697; 0855710	WHO recommended Limits
Temperature	**^{0} C**	24	27.6	26.9	28	-
ORP	**mV**	65.8	73	62.4	55.3	-
pH		7.02	6.93	7.11	6.4	6.5 – 8.5
Turbidity	**NTU**	1.9	2.2	2.1	1.5	<5.0
Salinity	**PSU**	0.01	0.02	0.02	0.09	<0.4
SSG	**δt**	0	0	0	0	-
DO	**%**	36.6	92.6	85.4	64	-
DO	**mg/L**	3.09	7.3	6.76	4.96	-
Electric conductivity	**µS/cm**	37	55	61	287	<450 µS
Total Dissolve Solids	**mg/L**	22	35	38	185	<248
Baro	**mb**	1013	1010	1011	1008	-
Depth	**m**	0.1	0.16	0.18	0.02	-

Table 5.1-5: Laboratory Test Results

Parameters	Units	Measured Value			WHO Drinking Water Recommended Limits
		Beye Stream	Hand Pump Well	Sewa River	
Residual Chlorine	mg/L	0.01	0.01	0.01	0.3 - 0.5 after 30 min. disinfection
Aluminium	mg/L	0.26	0.16	0.16	<0.2
Ammonia	mg/L	0.08	0.04	0.09	No. Value

Parameters	Units	Measured Value			WHO Drinking Water Recommended Limits
		Beye Stream	Hand Pump Well	Sewa River	
Bromine	mg/L	0.00	0.00	0.00	No. Value
Calcium Hardness	mg/L	4.00	4.40	2.10	<250
Copper	mg/L	0.05	0.04	0.05	<1.0
Fluoride	mg/L	0.02	0.04	0.11	<1.5
Iron	mg/L	0.30	0.03	0.15	<0.3
Magnesium	mg/L	0.10	0.10	0.01	<200
Manganese	mg/L	0.25	0.01	0.01	<0.1
Molybdenum	mg/L	0.01	0.02	0.01	0.25
Nitrite	mg/L	0.04	0.03	0.05	3
Nitrate	mg/L	1.00	8.00	1.00	<10
Potassium	mg/L	3.30	6.30	2.40	<6
Phosphate	mg/L	0.70	1.00	0.60	<20
Silica	mg/L	0.50	0.20	0.10	<15
Sulphate	mg/L	9.00	6.00	0.00	<400
Sulphide	mg/L	0.20	1.40	2.10	<0.5
Sulphite	mg/L	0.01	0.02	0.00	No. Value
Chloride	mg/L	4.50	4.00	2.20	<250
Arsenic	-	0.00	0.00	0.00	0.01
Chromium	mg/L	0.08	0.01	0.06	<0.05
Bicarbonate	mg/L	0.00	0.00	0.00	No. Value
Zinc	mg/L	0.15	0.00	0.00	<5.0
E.coli	-	0.00	0.00	0.00	Zero
Faecal Coliforms	-	20.00	30.00	101	Zero
Non-Faecal Coliforms	-	0.00	0.00	0.00	10
Vibro-parahaemolyticus	-	0.00	0.00	0.00	Zero
Salmonella sp	-	0.00	0.00	0.00	Zero

5.1.4.3 Discussion of Results

The physico/chemical analysis of the water sources indicate that many of the parameters are within the WHO recommended limits for drinking water. The parameters which fall short of the standards are highlighted in red font, and discussed in the following sections.

Aluminium:

Aluminium occurs in only trace amounts in natural water. Its concentration in natural waters can vary considerably depending on various physicochemical and mineralogical factors.

Dissolved aluminium concentrations in waters with near-neutral pH values usually range from 0.001 to 0.05 mg/litre but rise to 0.5–1 mg/litre in more acidic waters or water rich in organic matter.

Aluminium levels in the Beye stream exceeded recommended thresholds (0.26mg/l). Intake of large amounts of aluminium can cause anaemia, osteomalacia (brittle or soft bones), glucose intolerance, and cardiac arrest in humans. Research suggests that humans exposed to low levels of aluminium over a long period, may be exposed to earlier onset or progression of a wide range of diseases of the nervous system.

Chromium:

Chromium is an odourless and tasteless metallic element that occurs naturally in rocks, plants, soil and volcanic dust, and animals. Chromium is found naturally in the environment from the erosion of natural chromium deposits. Chromium can also be manufactured by industrial processes.

In our water sources we observed higher level of chromium in the Beye stream and Sewa River.

Chromium toxicity can cause irritations and ulcers in respiratory tract and stomach. It may also cause blood anaemia, Sperm damage and damage to the male reproductive system, and known to be human carcinogens.

Manganese:

Manganese is a mineral that naturally occurs in rocks and soil and may also be present in water due to underground pollution sources. When manganese is present in water it may contain black sediment and turbidity due to precipitated manganese. Fabrics washed in manganese-bearing water, can develop dark brown or black stains due to the oxidation of the manganese. In concentrations higher than 0.05 mg/l manganese may become noticeable by impairing colour, odour, or taste of the water. However, health effects do not become of a concern until concentrations of about 0.5mg/l are reached. A concentration of 0.25mg/l was determined in the sample from the Beye Stream, which is still within reasonably safe limits.

Ammonia:

Ammonia can be present in water in two forms, either ammonium hydroxide (NH_3) or as the ammonium ion (NH_4). When the pH of the water is less than 7 the ammonia is present as the ammonium ion. As pH increases above 7, more of the ammonia is present as ammonium hydroxide.

All three samples revealed some ammonia content, which is rarely found in unpolluted surface water or well water; water contaminated with sewage, animal wastes or fertilizer runoff may contain elevated levels. No direct health hazards are associated with the presence of ammonia, and as such a health based guideline for safe presence in water levels is not available.

Potassium:

Potassium is an essential element in humans, and is not found in drinking water at levels that could be a concern to human health. However, the consumption of drinking water treated by water softeners using potassium chloride may significantly increase exposure to potassium. This is not a concern for the general population. The borehole is the only water source with potassium level higher than the WHO recommended permissible limit. Generally potassium level in deep bedrock aquifers tend to be higher.

Faecal Indicator Bacteria:

Faecal coliforms are a group of intestinal tract microbes and their presence in drinking water sources is an indication of faecal contamination. According to the WHO, these bacteria should not occur repeatedly in drinking water. They therefore recommend zero faecal coliforms counts per 100 ml water sample. All three samples analysed showed detectable levels of faecal coliforms. The main health hazards linked with people using water contaminated with faecal coliforms include oral diseases such as cholera, typhoid, hepatitis A and other diarrhoeal diseases which are passed from excreta into the water supply.

6 DESCRIPTION OF THE SOCIAL ENVIRONMENT

The main ESIA report describes the national, regional and project area socio-economic and political contexts. It also included a socio-economic survey which was conducted in 22 villages within the STL start-up area, including the closest community to the site proposed for the development of the facility, Benduma Sewa.

This study involved consultations with the local populations in and around Benduma Sewa, with the aim of disclosing information on the project to them through discussions and interactive sessions. The aim of this was to determine their opinions and outlook on the development of this project close to their community.

6.1 Overview of Benduma Sewa

The Benduma Sewa is a small village in the Magbao Section of Lugbu Chiefdom, and at the time of the study, was made up of a population of 160 (including 50 children). The Magbao section is one of 6 sections in Lugbu Chiefdom, and is made up of a total of 7 small villages (Benduma Sewa, Heima, Karleh, Tongeh, Gbanahun, Vanima and Kpatema).

The general occupations of residents in Benduma Sewa are agriculture, diamond mining and some fishing activities. The agriculture sector, engaged in by most of the inhabitants, is dominated by crop farming which is mostly done on a subsistence basis, with the use of rudimentary production techniques. The main crops cultivated are rice, cassava, groundnut, potatoes, yam, cocoyam and palm oil plantations. Fishing is also done in the Sewa River which is less approximately 300 meters from the village.

The village has a total of 34 houses (6 thatch roofed and 28 zinc roofed houses). The only community facilities are a mosque and an open field, popularly used for football. No other facilities such as a local meeting house (*court barray*), church or school, were identified.

Zinc roofing in provincial villages is usually an indication of relatively higher standard of living. During consultations, the Town Chief revealed that following the payment of the crop compensation and annual land lease fees by Sierra Tropical Ltd, 14 thatch roofed houses had been rehabilitated and transformed into zinc houses.

6.2 Stakeholder Consultations

Consultations were held with community stakeholders closest to the proposed facility location, with the aim of raising their awareness of the planned development. A general chiefdom stakeholder meeting was held in Sumbuya, and subsequent meetings held in Benduma Sewa and Gelehun.

Figure 6.2-1: Meeting in Sumbuya

Figure 6.2-2: Meeting in Benduma Sewa

Figure 6.2-3: Meeting in Gelehun

The following tables provide information on the discussions that were held (attendance lists can be found in annex A of the appendices).

Table 6.2-1: Community Consultations Meeting Details

Meeting Date: **Time**: **Location**: **Number of Participants**:	10th December 2018 11:05 Sumbuya (Community Meeting House – *court barray*) 77
Meeting Date: **Time**: **Location**: **Number of Participants**:	12th December 2018 13:00 Benduma Sewa (Compound in private residence – Foday Alie) 70
Meeting Date: **Time**: **Location**: **Number of Participants**:	13th December 2018 11: 30 Gelehun (Community Meeting House – *court barray*) 21

The meetings started with prayers and introduction of the CEMMATS consultants and key community authorities, before going into discussions.

An overview of the project was given in each meeting which was followed by an interactive session.

6.2.1 Overview of Project given during Meetings

Mr Sinnah thanked everyone for participating in the meetings and informed them that the aim of the meetings was to enlighten them about the development of the STL processing facility near Benduma Sewa. He reminded participants about the previous Environmental and Social Impact assessments conducted in 2016, and informed them that the current studies were being done to supplement the information collected in 2016, and update the project reports.

Mr Sinnah described the nature of the project, which he explained would consist of 2 phases – the construction and operational phases. He described the construction phase as involving not only the construction of the buildings, but also the installation of equipment and machinery, and the development of support facilities such as the water treatment plant. He also described the operations phase which he informed them, involved processing of the harvested fruits so that they could be preserved and canned, and also converted into juice, for internal and external (export) consumption.

He went on to inform them that although STL had received an EIA Licence to proceed with the early phases of project implementation, the development of the processing facility was a major activity for which EPA-SL requires additional studies. This, he explained, was to ensure that the environment and surrounding communities are not adversely affected by the related activity. Mr Sinnah informed that the CEMMATS team was conducting this follow up assessment, to capture any negative, as well as positive impacts which this particular aspect of the project would generate. He assured participants that any concerns they had in relation to the project would also be captured and reported.

6.2.2 Details of interactive sessions

Following the overview of the project given by the CEMMATS consultant, participants were given the opportunity to make comments and ask questions. Table 6.2-2 presents the minutes of this session in each meeting.

Table 6.2-2: Minutes of Interactive Sessions

Comments/Questions	***CEMMATS Response***
Sumbuya Meeting	
<u>Modibor Fofanah - Regent Chief:</u> Thank you for calling this meeting and taking the time to explain the details of the project construction and operation of the processing facility to us. We the Chiefdom authorities are in support of the STL project and are praying for it to succeed. He advised that the consultations continue and that CEMMATS ensures that the potentially affected land	We are pleased to be a part of this process and are tasked with ensuring that you, the community stakeholders understand and have a say in the project.

Comments/Questions	***CEMMATS Response***
owners and communities are included in consultations.	
Samuel Gbonbon - Section Chief: When will the construction of the facility begin?	Plans are in place for the construction to commence in 2019, however, these will only proceed once the project has received approval from EPA-SL to proceed.
Anthony U. Amara – Councillor: What is the rationale for choosing Benduma Sewa for the location of the facility? We would have preferred that the processing facility be constructed in Sumbuya Town, which is the chiefdom headquarter town.	Several technical factors went into the selection of the current location, including accessibility (in relation to incoming harvest, and transporting requirements for export).
Hassan Bangura – Sumbuya Town Chief: Will the company provide any stipend for the chiefs of the project area, as chiefs are not allowed to work for the company, even though some of us are educated?	STL will be providing lease rent and compensation to land and crop owners, job opportunities to individuals who meet the company's requirements, and will assist in community development projects. Plans for individual assistance if at all will be at the discretion of the company.
Modibor Fofanah: Will STL employ people outside Benduma Sewa to work at the facility?	Benduma Sewa is a small community, with less than 200 adults, and not all of these will meet STL's criteria for employment. Job opportunities will be made open to people from other areas, but Benduma Sewa will always be given priority.
Benduma Sewa Meeting	
Musa Mattia – Town Chief: Thanks to the CEMMATS team for organising the meeting to inform us about this aspect of the project. Benduma Sewa has been aware of and given full support and cooperation to STL since the inception of the project, and we will continue to do so. We have willingly given our lands towards the success of this project, and will give more	We are pleased to note that Benduma Sewa has been in support of the STL project since its inception, and are here to ensure that through consultations, the project maintains transparency, and the good relationship between company and community continues.

Comments/Questions	*CEMMATS Response*
whenever the need arises.	
Abdulai Bassie – Youth Leader: I want to register my appreciation to STL for choosing Benduma Sewa as the location for the processing facility, and I look forward to it changing our lives through the provision of employment.	Your sentiments are noted and will be reported.
Tenneh Abdul – Chair Lady: Will women be employed during the construction and operations phases of the project?	The employment of women is highly encouraged, as long as the women meet the job requirements.
Ishmael Jabbie – Imam: Which construction company has been contracted for the construction works?	At this stage of the project, a construction contractor has not been selected. A bidding process will be implemented to select a company.
Joe Senesie – Farmer: Will STL's headquarters be situated in Benduma Sewa	The main administrative office for the cannery will be included in the building. The administrative centre for the agricultural aspect of the project will be located in a different area and is not included in this assessment.
Mariama Borbor – Farmer How many people would be employed at the facility for the construction phase?	It is not certain how big the construction workforce will be. The construction contractor has not been selected yet.
Fatu Abu – Resident How long will the construction phase last?	Construction will last between 18 and 24 months.
Gelehun Meeting	
Joe Luseni – Town Chief: I am glad that an assessment on the development of the facility is being carried out as Gelehun shares a boundary with Benduma Sewa and will likely be equally	CEMMATS' assessment on the project is not limited to social consultations; we also have environmentalists on the team who are currently on the ground looking into potential

Comments/Questions	*CEMMATS Response*
impacted, either positively or negatively. If heavy duty trucks will be plying our roads, between the facility and Freetown, please ensure that the issues of traffic safety, dust generation, etc. are adequately addressed.	environmental issues that may arise from the project.
Karimu Koroma – Farmer: We are pleased that Benduma Sewa has been chosen for this project. We are sure that the project will bring many benefits to our communities, but our community health and safety issues need to be looked into.	Community Health and Safety is of paramount concern, and there will be mitigation measures and management plans developed to ensure negative impacts are averted or minimised.
Madam Baby Sami – Women's Leader: As a mother, I am excited about the project being implemented in our community because it will improve our lives.	Your sentiments are noted and will be recorded.
Sumaila Abdulai – Farmer: Will STL require part of our land for the construction?	No, the site for the construction of the facility has already been leased, and is on Benduma Sewa land.
Wuya Mustapha – Farmer: When will the construction work begin?	It is scheduled to start in 2019, but will only proceed after approval by the EPA-SL and other relevant MDAs.

6.3 Summary of Meeting Outcomes

The meetings provided opportunities for residents of the communities closest to the planned facility site, and stakeholders of the chiefdom headquarter town to ask questions and raise any concerns they might have about the project.

Information on the proposed development of the processing facility was received positively, with some participants from Benduma Sewa expressing their continued support of STL, highlighting their good relationship with the company since the inception of the project.

Comments and questions varied widely, but several questions were fielded around the construction of the facility, regarding start date, duration and employment opportunities during this phase. A few participants while supporting the project, stressed the importance of looking into community health and safety issues related to road accidents and dust generation

resulting from the movement of produce trucks plying community roads. Clarification was also sought on issue of job opportunities and how hiring will be handled and whether women will be encouraged to apply.

The consultations yielded overall, positive feedback from community stakeholders. It is essential that consultations continue throughout project implementation to maintain transparency and also to provide opportunities for any grievances to be aired. The Public Consultation and Disclosure Plan developed during the initial study, provides guidelines and assigns responsibility for the implementation of a PCDP programme, as well as guidelines for the development of a grievance mechanism system. The PCDP developed for this project, serving as an addendum to the main PCDP for the project some additional information relevant to this aspect of the project, and the project as a whole.

7 IDENTIFICATION OF POTENTIAL IMPACTS

7.1 Introduction

This chapter identifies and describes the potential environmental and social impacts of the processing facility development and operations, on the biophysical and socioeconomic conditions of the environment and communities. Where applicable, it also identifies mitigation measures that will reduce adverse impact and enhance positive ones.

7.2 Environmental and Social Impact Assessment

7.2.1 Background

The impact assessment study (informed by a combination of desktop studies and on-site observations by the project team) was carried out on the potential environmental and social impacts of the project implementation at the time of the study. This was done in order to first, determine the potential for such impacts, and secondly, to identify and propose mitigation measures that would enable avoidance or reduction of severity should the potential impacts occur or to increase the benefit of potential positive impacts.

7.2.2 Impact Assessment Matrix

Tables 7.2-1 to 7.2-3 describe the various impact categories.

Table 7.2-1: Degree of Certainty of Impact

Certainty of Impact	Description
Certain	The incidence of this impact is unavoidable and to be expected.
Very Likely	There is a high percentage of possibility for this impact to occur, and measures need to be put in place to mitigate it.
Likely	There is an even chance that the impact will may occur
Unlikely	The possibility of this impact occurring is remote, however it must be considered

Table 7.2-2: Environmental and Social significance scale

Significance scale	Description
Very High	Major or permanent alteration of environmental or social dynamics, with severe or very severe consequences, or (in the case of benefits), beneficial or very beneficial effects.
High	Long term effect on the social or natural environment. This category should be treated with a significant degree of importance at the project decision making stage.
Moderate	Medium to long term effects on the social or natural environment. This category should also be taken into cognizance in decision making as constituting a fairly important degree of threat. The threat is real but not substantial.
Low	These would have medium to short term ramifications on the social or natural environment; these are relatively unimportant and pose very little real threat.

Table 7.2-3: Degree of Difficulty to Mitigate

Degree of Difficulty	Description
Very Difficult	The impact can be mitigated in theory, but the extent of financial or technical involvement militates against its application or effectiveness
Difficult	The impact can be mitigated, but there is a significant degree of difficulty in implementing the proposed measured.
Achievable	The impact can be mitigated without much technicality or cost.
Easily Achievable	The impact can be easily and effectively mitigated

Table 7.2-4: Impact Assessment Matrix

Mitigation Potential	Impact Significance				Certainty of Impact
	Low	Moderate	High	Very High	
Very Difficult	Medium	Major	Extreme	Extreme	Certain
Difficult	Minor	Medium	Major	Extreme	Very Likely
Achievable	Minor	Minor	Medium	Major	Likely
Easily Achievable	Minor	Minor	Minor	Medium	Unlikely

Table 7.2-5: Categories of Impact

Impact	Description
Extreme	Very significant action would be required to avoid or reduce these impacts. In certain instances, such impacts would prevent the action or option concerned from being taken or approved; and alternatives would have to be considered.
Major	These impacts are significant, meaning that if effective mitigation measures are not taken, a project may be hindered from commencing or continuing. Such option would require effective management and monitoring or abandoned altogether for other options.
Medium	These impacts though important, are of less serious nature; in such a case, the Best Available Technology (or Practice) Not Entailing Excessive Cost (BATNEEC) should be employed. Such impacts alone are usually not significant enough to prevent a project from commencing or proceeding.
Minor	These impacts fall within the acceptable limits of the impact of a project on the environment, and mitigation in desirable but not necessary. This does not preclude 'Best Practice' as a means of avoiding cumulative impacts.
Positive	A beneficial impact to the bio-physical and/or socio-economic environment.

7.2.2.1 Environmental and Social Impacts during the Planning and Design/Construction Phase

Impacts at this stage are often temporary. At the planning stage, the main concern will be ensuring that designs are done in such a way as to limit the negative environmental and social impacts that could occur during construction and operations.

During the construction stage, traffic accidents, occupational safety incidents, as well as environmental impacts are paramount. Risks can be reduced by strict adherence to best construction management practices. The impacts anticipated at the construction stage, their recommended mitigation and enhancement measures and residual impacts are shown in the **Error! Not a valid bookmark self-reference.**.

Table 7.2-6: Planning and Design/Construction Phase - Environmental and Social Mitigation Measures

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
Air Quality	Dust generated from construction machinery can cause considerable nuisance to nearby communities, and can cause health problems including respiratory complaints / diseases.	Certain	High	Major	- Dust minimization measures shall be implemented including watering of the construction areas, including the road surfaces under construction. - Soil stockpiles and stores of friable material will be covered to reduce the potential for fugitive emissions of dust where possible. - Vehicles carrying friable materials will be enclosed or sheeted. - Loading, unloading and handling of dusty materials will only be carried out in designated areas. - Workers would be provided with dust protection PPE	Achievable	Moderate	Minor
	Emissions from construction activities like fuel combustion, in diesel generators, concrete batching plant, operational vehicles could cause adverse impacts on air quality affecting the health and welfare of people, crops and sensitive natural fauna and flora	Very likely	Moderate	Medium	- Effective preventative maintenance established to ensure all construction equipment and electricity generators are maintained in good working order and do not adversely impact air quality due to inadequate maintenance or damage. - Concrete batching, crushing and screening plants will be fitted with dust extraction and / or suppression systems where necessary.	Achievable	Low	Minor
Climate Risk	The production of greenhouse gases from the exhaust emissions from construction machinery would during this phase, contribute negatively towards climate change.	Likely	Moderate	Medium	- Effective preventative maintenance established to ensure all construction equipment are maintained in good working order so as not to produce an inordinate/excessive amount of exhaust emissions. - Construction machinery will not be allowed to remain in idle mode over extended periods. - Use of ozone depleting substances such as chlorofluorocarbons (CFCs), halons, carbon tetrachloride, trichloroethane and halogenated hydrobromofluorocarbons (HBFCs) will not be	Achievable	Low	Minor

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
					permitted.			

Noise and Vibration	Noise and vibration result from construction activities such as the operation of heavy machinery, concrete mixing plants, stone crushing, etc.
	Noise and vibrations will be a source of disturbance to communities within the project areas; workers will also be at risk of exposure to elevated noise levels posing health risks.
		Certain	Moderate	Major	- Activities producing excessive noise levels, will be restricted to the day-time, and equipment normally producing high levels of noise will be suppressed or screened when working within a distance of some 200 m from any sensitive noise receptors (particularly along access road alignments)
					- Near places of worship, construction producing nuisance level noise be minimised or rescheduled so as not to occur on locally recognised religious day. This is particularly relevant along the access road alignment.
					- Work areas, will be organised and operated to restrict noise levels to not exceed recommended thresholds at the nearest sensitive receptor during normal activities. As current noise levels in and around the project area already exceed this threshold value (55dB), the project will strive to not cause more than a 3dB increase in measured ambient levels during normal activities.
					- Advance notice will be given to communities if short-term noisy construction activities are to take place, which could cause these levels to be exceeded.
					- Measures to minimize noise during construction will include:
					  - locating and orientating equipment to maximise the distance, and to direct noise emissions away from, sensitive areas;
					  - using buildings, earthworks and material stockpiles as noise barriers where possible, and
					  - Turning off equipment when not in use.
					- A preventative maintenance program established for equipment and vehicles to not emit excessive noise or vibration due to inadequate maintenance or damage
					- Personnel will be made aware of the importance of minimising noise and the measures that are required in this regard.
						Difficult	Moderate	Medium

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
Soil Erosion	Soil erosion is likely to occur as a result of earthworks including the exposure of loose soil. Eroded material can end up in watercourses, affecting water quality.	Very Likely	High	Major	- Slope stability measures will be incorporated such as benching and installation of erosion protection features such as silt barriers and sedimentation ponds. - Land area to be cleared will be kept to the minimum necessary to prevent disturbance of soils outside the streams or other surface water bodies will be protected where practicable to provide natural attenuation of flows. - In areas of ground clearance, topsoil will be stripped and salvaged as much as possible	Achievable	High	Medium
Water Quantity	Water abstraction from local water sources may result in reduced water availability to local communities	Likely	High	Medium	- Water for construction will be sourced from project boreholes. - Water use will be monitored and recorded to maximise efficiency of water use and minimise waste. - Re-use of water will be undertaken where practical and safe.	Achievable	Moderate	Minor
Water Quality	Pollution of water resources may arise at as a result of accidental spillage or leakage of construction or waste materials.	Likely	High	Major	- Refuelling, maintenance and wash-down of construction vehicles and equipment will only occur in designated areas and away from surface water bodies, and provided with secondary containment measures. - The construction contractor will be contractually required to take all reasonable precautions to prevent and clean up all spills / leaks, and take necessary measures to prevent materials from falling into the river.	Difficult	Moderate	Medium
Aquatic Ecology	Aquatic flora and fauna may be affected as a result of pollution from soil and other contaminants being carried into water ways by surface runoff. Organisms may die or have their mating,	Likely	Moderate	Minor	- The construction contractor will implement waste management and environmental health and safety plans to limit water pollution.	Easily achievable	Low	Minor

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	migration and other activities interrupted.							
Terrestrial Fauna	Mammals, small reptiles and birds will be impacted by construction activities.	Likely	Low	Medium	- Some species of global conservation significance (endangered and vulnerable) were identified in Lugbu Chiefdom during the initial ESIA study conducted in 2016. - Workers would be advised that in the unlikely event animals are encountered, they are not to be killed; but instead caught and released into a similar environment.	Achievable	Low	Minor
Vegetation	Vegetation in the vicinity of the construction works will be lost	Certain	Moderate	Medium	- Vegetation clearing will be confined to the immediate construction site.	Difficult to	Moderate	Medium
Construction Planning and Design	Improper planning at this stage will result in catastrophic consequences which may result in injury, loss of property and/or life	Likely	High	Major	Proper planning towards the construction phase including choice of construction standards, materials, equipment, contractor, etc will greatly minimise this risk.	Easily Achievable	Low	Minor
Waste Management	Improper management of waste may result in environmental and human health hazards such as pollution and disease.	Likely	High	Medium	- Waste bins will be provided at all construction sites (facility and road works sites) for the disposal of the various types of wastes generated by the project. These bins will be clearly marked to facilitate segregation of waste, for collection, transportation and disposal. - Separation of domestic and hazardous waste at the source shall be strictly enforced. - Where possible, wastes will be re-used or recycled. - Burning of waste will not be permitted - All personnel will be trained in the appropriate management of	Achievable	Low	Minor

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
					waste according to the WMP.			
Waste Oil Management	Improper management of waste oils could result in soil contamination as well as contamination of ground and surface water sources (through seepage and surface runoff).	Likely	High	Medium	- Waste oils generated by the project (vehicles and machinery) will be collected and stored in sealed containers and arrangements made with companies who can use them in their operations or manage their disposal. - Soils contaminated by waste oils encountered during the project will be scraped away and bagged, for disposal in a designated section of a waste dump area (in the absence of locally available recommended disposal methods).	Difficult	Moderate	Medium
Emergency Response and Disaster Management	Loss of life, injury, damage to equipment etc.	Likely	High	Major	- Implementation of Emergency Response Plan, - Awareness raising among workers - Monitoring of potential situations leading to disaster.	Achievable	Moderate	Medium

Road Safety	Rehabilitation works will be carried out on the access road, exposing the public to road works-related hazards.	Very likely	High	Major	- Community consultations and meetings on the ongoing roadworks and related hazards will be held.
					- Active sites will be sealed off from the public using reflective tapes and cones; where necessary road diversions will be created.
					- Road safety initiatives will be developed and implemented, including:
					  - Ensuring that only qualified (licenced) drivers operate machinery;
					  - Implementing speed limits and traffic control measures in appropriate locations;
					  - Implementing road safety signage;
					  - Installing speed control devices such as governors on trucks
						Achievable	Moderate	Minor

Occupational Health and Safety	Injuries at construction work-sites, falling objects, as well as from the use of equipment and tools, cuts from stepping	Likely	High	Medium	- The contractor will be required to submit an OHS management plan - Workers will be provided with all the required PPE. - Toolbox talks will be carried out daily on safe work practices and	Achievable	Moderate	Minor

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	on sharp objects such as nails and other metal off-cuts are likely to occur.				other OHS issues.			
Gender Based Violence	Negative consequences resulting from the influx of construction workers in a community including increase in incidences of domestic violence, rape, sex work, etc	Likely	High	Extreme	- Incorporate GBV policies into contracts for construction contractors. - Construction contractors will be required to produce GBV management procedures and requirements to be adhered to by workers. - Promote female-friendly hiring and working conditions including the provision of separate toilet facilities for male and female workers, daylight working hours, etc. - Implement effective reporting and response mechanism for handling GBV complaints within the workforce and the project site community. - Develop GBV awareness programmes for communities through radio jingles, leaflets, posters, meetings, etc.	Achievable	Moderate	Medium
STDs, HIV/AIDS and Teenage Pregnancy Issues	The risk of the prevalence of STDs, HIV/AIDS and teenage pregnancy in nearby communities is increased with the interaction of construction workers with community youth.	Likely	High	Major	- Sensitization and awareness raising will be provided among workers and communities. - All Project personnel will be provided with appropriate induction training communicating health hazards, including HIV/AIDS, STDs and malaria along with the prevention and mitigation measures required. - Inappropriate behaviour by Project personnel will be carefully managed through relevant human resources processes, to minimise the potential spread of illnesses and infective diseases.	Difficult	Moderate	Medium
Community Health	Pollution of air, water or soils and the release of hazardous substances or inappropriate management of waste	Likely	High	Medium	- Community health and safety will form an integral part of the construction management plan. - Community consultation and awareness raising on construction and road rehabilitation progress along the access road will be carried out	Achievable	Moderate	Minor

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	could adversely impact on the health and welfare of the community or lead to increased occurrence of pest species (vermin, flies, mosquitoes).				throughout project implementation. Communities will be advised on safety measures to take and the meanings of signs to be used. - A high standard of housekeeping will be maintained at all times in all construction work areas. - Pools of standing water will be avoided to minimise the availability of breeding grounds for mosquitoes.			
Security	Security risks to construction workers arising from attempted theft of construction materials, tensions arising over grievances, and unrealistic expectations.	Likely	Moderate	Medium	- Regular consultations with communities will be held to provide clarity and promote transparency on the project. These meetings will prevent build-up of animosity from grievances or unfulfilled expectations which could result in violence. - Construction materials will be stored securely.	Achievable	Low	Minor
Visual Impact	Adverse visual impact connected with construction works.	Certain	Low (temperate)	Minor	- No direct mitigation measure	Difficult	Low	Minor
Community Benefits from Project	Job Opportunities for skilled and unskilled members of the community Business opportunities to provide goods and services to workers (e.g. food and drink)	Likely	Moderate	Positive	- Although labour recruitment is a matter for the contractor, who has the right to determine whom to employ, he will be formally encouraged to hire locally wherever possible, in order to maximise the benefit distribution and social acceptability of the project. - Opportunities for sustainable local procurement of goods and services to support road construction will be identified wherever possible and measures will be devised to maximize the potential for these opportunities.	Achievable	High	Positive

7.2.2.2 Environmental and Social Impacts during Operations

Once best practices have been observed during the initial stages of the project - planning/design set up and construction stages - much of the threat to the safety and integrity of the environment and society will be reduced to levels defined by legislation and best practices.

Table 7.2-7: Operational Phase – Environmental Impacts and Mitigation Measures

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
Air Quality	Dust generated from the movement of company vehicles, including trucks, can cause considerable nuisance to communities along the access road and can cause health problems including respiratory complaints / diseases.	Certain	High	Major	- Dust minimization measures shall be implemented including watering of the access road. - Speed limits will be implemented and enforced.	Achievable	Moderate	Medium
	Emissions from vehicles, equipment and machinery could cause adverse impacts on air quality affecting the health and welfare of workers	Very likely	Moderate	Medium	- Effective preventative maintenance established to ensure all vehicles and machinery are maintained in good working order and do not adversely impact air quality due to inadequate maintenance or damage.	Achievable	Low	Minor
Climate Risk	The production of greenhouse gases from the exhaust emissions of vehicles and machinery would contribute negatively towards climate change.	Likely	Moderate	Major	- Effective preventative maintenance established to ensure all construction equipment are maintained in good working order so as not to produce an inordinate/excessive amount of exhaust emissions. - There are long term plans in place to implement renewable energy generation options to reduce or eliminate dependence on fossil fuel generators - Use of ozone depleting substances such as chlorofluorocarbons (CFCs), halons, carbon tetrachloride, trichloroethane and halogenated hydrobromofluorocarbons (HBFCs) will not be permitted.	Achievable	Low	Medium
Noise and Vibration	Noise generating operations may cause adverse health effects on	Certain	Moderate	Major	- Personnel will be provided with noise protection PPE for use in noisy areas of the facility. - Noisy machinery (e.g. generators) will be housed/screened where	Achievable	Moderate	Medium

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	workers.				possible to contain the sound to a limited area. - Workers in noisy areas will not be allowed to work for more than 8hours at a time in the noisy environment			
Water Quality	Pollution of water resources may arise at as a result of effluent from the facility	Likely	High	Major	- A Waste Water Treatment Plant will be installed which includes several settling ponds, aerated and facultative lagoons. Water quality will be monitored at each step, and final effluent into the environment will meet WB effluent standards.	Difficult	Moderate	Medium
Waste Management	Improper management of waste may result in environmental and human health hazards such as pollution and disease.	Likely	High	Medium	- Waste bins will be provided in all areas of the facility for the disposal of the various types of wastes generated by the project. These bins will be clearly marked to facilitate segregation of waste, for collection, transportation and disposal. - Separation of domestic and hazardous waste at the source shall be strictly enforced. - Where possible, wastes will be re-used or recycled. - Burning of waste will not be permitted - All personnel will be trained in the appropriate management of waste according to the WMP.	Achievable	Low	Minor
Waste Oil Management	Improper management of waste oils could result in soil contamination as well as contamination of ground and surface water sources (through seepage and surface runoff).	Likely	High	Medium	- Waste oils generated by the project (vehicles and machinery) will be collected and stored in sealed containers and arrangements made with companies who can use them in their operations or manage their disposal.	Difficult	Moderate	Medium
Emergency Response and Disaster Management	Loss of life, injury, damage to equipment etc.	Likely	High	Major	- Implementation of Emergency Response Plan, - Awareness raising among workers - Monitoring of potential situations leading to disaster.	Achievable	Moderate	Medium

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category

Road Safety	Increase in vehicular movement through communities previously unexposed to such activity, will expose them to road safety risks	Very likely	High	Major	- Community consultations and meetings on road safety issues will be carried out throughout the project
					- The road will be monitored for potholes or other defects which pose safety risks.
					- Road safety initiatives will be developed and implemented, including:
					  - Ensuring that only qualified (licenced) drivers operate vehicles;
					  - Implementing speed limits and traffic control measures in appropriate locations;
					  - Implementing road safety signage;
					  - Installing speed control devices such as governors on trucks
						Achievable	Moderate	Minor

Occupational Health and Safety	Work related injuries could occur, particularly as workers may not be familiar with the operational methods and machinery	Likely	High	Major	- Workers will be provided with all the required PPE. - Worker induction, followed by regular training on operational and safety issues will be conducted throughout employment - Toolbox talks will be carried out daily on safe work practices and other OHS issues. - First aid facilities will be available in all work areas - Medical facilities will be available to all workers.	Achievable	Moderate	Minor
Gender Based Violence	Negative consequences resulting from the influx of processing facility workers could increase in incidences of domestic violence, rape, sex work, etc. Work based gender based	Certain	High	Major	- Promote female-friendly hiring and working conditions including the provision of separate toilet facilities for male and female workers, daylight working hours, well-lit spaces, etc. - Implement effective reporting and response mechanism for handling GBV complaints within the workforce and the project site community. - Develop GBV awareness programmes for communities through	Achievable	Moderate	Medium

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	violence may occur.				radio jingles, leaflets, posters, meetings, etc.			
STDs, HIV/AIDS and Teenage Pregnancy Issues	The risk of the prevalence of STDs, HIV/AIDS and teenage pregnancy in nearby communities is increased with the interaction of the processing facility workers with community youth.	Likely	High	Major	- Sensitization and awareness raising will be provided among workers and communities. - All Project personnel will be provided with appropriate induction training communicating health hazards, including HIV/AIDS, STDs and malaria along with the prevention and mitigation measures required. - Inappropriate behaviour by Project personnel will be carefully managed through relevant human resources processes, to minimise the potential spread of illnesses and infective diseases.	Difficult	Moderate	Medium
Security	Security risks to construction workers arising from attempted theft of construction materials, tensions arising over grievances, and unrealistic expectations.	Likely	Moderate	Medium	- Regular consultations with communities will be held to provide clarity and promote transparency on the project. These meetings will prevent build-up of animosity from grievances or unfulfilled expectations which could result in violence. - The facility will be sealed off from the public and security services contracted for 24hr protection.	Achievable	Low	Minor
Community Benefits from Project	Job Opportunities for skilled and unskilled members of the community Business opportunities to provide goods and services to workers (e.g. food and drink)	Likely	Moderate	Positive	- Although labour recruitment is a matter for the contractor, who has the right to determine whom to employ, he will be formally encouraged to hire locally wherever possible, in order to maximise the benefit distribution and social acceptability of the project. - Opportunities for sustainable local procurement of goods and services to support road construction will be identified wherever possible and measures will be devised to maximize the potential for these opportunities.	Achievable	High	Positive

7.2.2.3 Termination/Decommissioning Stage

It is now common practice that closure operations are integrated into the planning/design, and operational stages, as the environmental gains of implementing certain mitigation measures may take much longer to be realized. This approach reduces the burden and cost of an end of project rehabilitation, reclamation or clean-up. Closure activities are generally performed to stabilize the site, and remove fixed and moveable surface and sub-surface structures.

Impacts generated during this phase are similar to construction phase impacts and are often temporary, clearing up within a short space of time from completion of the decommissioning activities.

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Table 7.2-8: Decommissioning Phase – Environmental and Social impacts

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
Air Quality	Dust generated from decommissioning machinery and activities (demolishing of buildings, land grading and contouring, etc.) can cause considerable nuisance to workers and nearby communities, and can cause health problems including respiratory complaints / diseases.	Certain	High	Major	- Dust minimization measures shall be implemented including watering of the project site - Soil stockpiles and stores of rubble and friable material will be covered to reduce the potential for fugitive emissions of dust where possible. - Vehicles carrying rubble/friable materials will be enclosed or sheeted. - Loading, unloading and handling of dusty materials will only be carried out in designated areas. - Workers will be provided with dust protection PPE	Achievable	Moderate	Minor
Climate Risk	The production of greenhouse gases from the exhaust emissions from earthmovers, bulldozers and other equipment contribute negatively towards climate change.	Likely	Moderate	Medium	- Effective preventative maintenance established to ensure all machinery are maintained in good working order so as not to produce an inordinate/excessive amount of exhaust emissions. - Machinery will not be allowed to remain in idle mode over extended periods.	Achievable	Low	Minor
	Cessation of greenhouse gas generation at end of project life, and on completion of decommissioning	Certain	High	Positive	-		High	Positive
Noise and Vibration	Noise and vibration result from decommissioning activities such as the operation of heavy	Certain	Moderate	Major	- Activities producing excessive noise levels, will be restricted to the day-time, and equipment normally producing high levels of noise will be suppressed or screened. - Advance notice will be given to communities if short-term noisy	Difficult	Moderate	Medium

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	machinery, will be a source of disturbance to communities within the project areas; workers will also be at risk of exposure to elevated noise levels posing health risks.				construction activities are to take place. - Personnel will be provided with noise protection PPE and gloves to minimise vibration effects.			
	Cessation of operations at the end of project life, and on completion of decommissioning. Noise levels in this area will likely return to ambient community levels.	Certain	High	Positive			High	Positive
Soil Erosion	Soil erosion is likely to occur as a result of earthworks including the exposure of loose soil. Eroded material can end up in watercourses, affecting water quality.	Very Likely	High	Major	- Slope stability measures will be incorporated such as benching and installation of erosion protection features such as silt barriers and sedimentation ponds. - Loose soil will be compacted and debris cleared away from the site. - Ideally, plant local/native species of vegetation to anchor the soil and prevent erosion.	Achievable	High	Medium
Water Quantity	Boreholes left behind by the company will be available for community use, increasing water availability and accessibility.	Likely	High	Positive	- Sensitize community on how to properly maintain and treat the boreholes as necessary	Achievable	High	Positive
Water Quality	Pollution of water resources may arise from debris and waste	Likely	High	Medium	- The decommissioning contractor will be contractually required to take all reasonable precautions to prevent and clean up all spills / leaks, and take necessary measures to prevent materials from falling	Difficult	Moderate	Medium

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	materials from the site.				into the river. - Water quality monitoring tests will be implemented in the Sewa River and surrounding water bodies for a period of 2 years following decommissioning.			
Ecology	Flora and fauna will flourish on site once operational activities and rehabilitation of the land are completed.	Likely	High	Positive	- Local species will be introduced to the project site. - Monitoring will be conducted for up to 1 year following decommissioning to ensure that rehabilitation has been effective.	Achievable	High	Positive
Waste Management	Improper management of waste may result in environmental and human health hazards such as pollution and disease which may have long term implication on the project environment and community.	Likely	High	Major	- All wastes will be cleared away from the site. - Where possible, wastes will be offered or sold to communities for re-use, recycling or repurposing. - Burning of waste will not be permitted - Soil tests will be performed to ensure that no contaminated soil is left behind, particularly in former waste storage areas, fuel storage areas, etc.	Achievable	Low	Minor
Occupational Health and Safety	Injuries could occur at decommissioning sites include from falling objects, use of equipment and machinery, cuts from stepping on sharp objects.	Likely	High	Medium	- Workers will be provided with all the required PPE. - Toolbox talks will be carried out daily on safe work practices and other OHS issues.	Achievable	Moderate	Minor
Community Health and Safety	Community exposure to risks associated with the facility's operations and movement of vehicles	Certain	Moderate	Positive	- All facilities, above and underground (if applicable) will be cleared away from the site to ensure that they do not pose any danger to the public.	Achievable	Moderate	Positive

Environmental Aspect	Impact Description	Certainty of Impact	Significance	Pre-Mitigation Impact Category	Mitigation / Enhancement Measure	Mitigation Potential	Significance	Post-Mitigation Impact Category
	will dissipate on closure at the end of project life.				- Any cavities or depressions will be filled.			
Community Benefits from Project	The community will have access to the land once the project reaches its end of life.	Likely	High	Positive	- Soil and water tests, and monitoring of the revegetation of the land will be carried out to ensure that the environment is healthy to support economical use of the land.	Achievable	High	Positive

8 CONCLUSION

8.1 Summary

The Sierra Tropical Agro-processing project includes the establishment of fruit plantations and a processing facility in Bo District, Sierra Leone. The project intends to roll out in phases, with the start-up areas for the first 2 phases of the project being implemented in Lugbu Chiefdom.

An ESIA study covering the start-up phases of the project was conducted and an EIA Licence issued in 2018. This addendum provides additional information on developments to be implemented during these phases, in the form of the processing facility.

Details of the processing facility could not be included in the initial ESIA as its development depended on the success of the first phase and early second phase of the project. It was planned that the processing facility would only be constructed if the quality/productivity of the fruits met the anticipated targets. The development of the facility which will process the raw materials into manufactured products in various packages of cans, drums, plastics and boxes has now been confirmed, necessitating an update of the original ESIA reports.

This addendum builds on the original ESIA studies, describing components of the facility's development including construction and operations. The environmental and social baselines within and around the project site are investigated and described, and relevant legislation applicable to the construction and operation of such a facility discussed.

A separate volume, which serves as an addendum to the main Environmental and Social Management Plan (ESMP) developed during the initial ESIA studies, has been prepared. It centres on the management of impacts identified in this study, relating specifically to the processing facility.

8.2 Conclusion

Environmental impacts of the project's components have been identified for all phases of the project. Mitigation measures have been presented and management plans developed to effectively manage identified impacts.

The design and construction phase of the project is most crucial, as effective design and planning at this stage, taking into consideration environmental and social issues, will go a long way towards eliminating or minimising impacts during the subsequent phases of the project.

Generally, the investigations reveal that environmental and social problems incurred by the project can be adequately managed and that there are no insurmountable problems that should stop the project from proceeding.

Several of the impacts identified during the construction phase of the project will be temporary, and will not recur or persist on completion of this phase. During operations, the development and implementation of management and monitoring systems are crucial to effective management of impacts.

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