

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)
OF THE
THE SIERRA TROPICAL LTD'S AGRICULTURAL PROJECT IN LUGBU CHIEFDOM,
BO DISTRICT**

**ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS
(ESMP)**

Prepared by

CEMMATS Group Ltd



Freetown, Sierra Leone

on behalf of:

**SIERRA TROPICAL
LIMITED (STL)**

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TABLE OF CONTENTS

ACKNOWLEDGEMENT.....	III
LIST OF TABLES	VII
ACRONYMS	VIII
1 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	1
1.1 Content of ESMP Report	1
2 ENVIRONMENTAL HEALTH AND SAFETY PLAN (EHSP).....	4
2.1 Introduction.....	4
2.2 Environmental, Health, And Safety Guidelines For Perennial Crop Production (IFC) 4	
2.2.1 Soil Conservation and Management	5
2.2.2 Nutrient Management.....	6
2.2.3 Crop Residue and Solid Waste Management	7
2.2.4 Water Management	9
2.2.5 Pest Management	10
2.2.6 Fertilizers.....	13
2.2.7 Biodiversity and Ecosystems	14
2.2.8 Energy Use	14
2.2.9 Air Quality	15
2.2.10 Greenhouse Gas (GHG) Emissions	16
2.3 Sierra Tropical Ltd’s Plans for Environmental Management	16
2.3.1 Environmental Initiatives	20
2.4 Occupational Health and Safety Plan	21
2.4.1 Occupational Health and safety: IFC Environmental, Health, and Safety (EHS) Guidelines.	21
2.4.2 Risk Assessment and Evaluation.....	23
2.5 Effective Organization and Management Responsibilities	24
3 WASTE MANAGEMENT PLAN (WMP)	27
3.4.1 Reuse, Recycling and Minimization of Waste Generation	28
3.4.2 Housekeeping:.....	29
3.5 Types of Waste	29
3.5.4 Sewage	32
4 PESTICIDE AND CHEMICAL MANAGEMENT PLAN (PCMP).....	33
4.1.1 Introduction	33
4.1.2 Impacts of Agro-chemicals on the Environment.....	33
4.1.3 Integrated Pest Management (IPM)	34
4.1.4 Alternatives to Fertilizer and other Chemicals Use.....	35
4.1.5 Responsibility for Implementation of Plan	38
5 EMERGENCY RESPONSE PLAN (ERP)	39
5.1 Introduction.....	39
5.2 Emergency Response Plan	39
5.2.1 Occupational/Environmental Incidents	40
5.3 Organization and Management Responsibilities	44
5.3.1 Emergency Response Team	44
5.3.2 Emergency Management Teams (EMT)	45
5.3.3 Manager Responsibilities	45

5.4	Emergency Response Training	45
5.4.1	Employee and Contractor Training	46
5.4.2	Emergency Drills	46
5.5	Communications	47
5.5.1	Internal Communications	47
5.5.2	Communications during an Emergency	47
5.5.3	Communications with the Public	47
5.6	Grievances, Disputes and Security	48
6	RESETTLEMENT POLICY FRAMEWORK (RPF).....	50
6.1	Introduction.....	50
6.2	Grievance and Redress Mechanisms.....	50
7	COMMUNITY DEVELOPMENT ACTION PLAN (CDAP)	52
7.1	Introduction.....	52
7.1.1	Purpose and Objectives	52
7.1.2	Sources of Data and Information	52
7.2	Project Area.....	53
7.3	Possible Areas for Community Development.....	53
7.3.1	Agriculture	53
7.3.2	Health	58
7.3.3	Education.....	60
7.3.4	Water and Sanitation	60
7.3.5	Sustainable Use of Energy Sources.....	61
7.3.6	Other Local Initiatives Promotion	62
7.4	Implementation Plan	62
7.4.1	Community Development Committee	62
7.4.2	Appointment of Implementation Agents	63
7.4.3	Budget	64
7.5	Monitoring And Evaluation	65
7.6	CDAP Summary of Possible areas of Development.....	65
8	PUBLIC CONSULTATION AND DISCLOSURE PLAN (PCDP)	68
8.1	Objectives of PCDP.....	68
8.2	Resources and Responsibilities	68
8.2.1	Stakeholders	69
8.2.2	Consultation and Disclosure Program.....	69
8.2.3	Notification for Meetings	69
8.2.4	Grievance Mechanisms	70
8.2.5	Reporting.....	71
8.3	Public Consultation During ESIA Study	71
9	CLOSURE PLAN	72
9.1	Decommissioning.....	72
9.2	Reclamation and Closure Plan	72
9.2.1	Approach.....	72
9.3	Objectives.....	72
9.4	Closure and Reclamation Methods	73
9.4.1	Surface Grading	73
9.4.2	Sediment and Erosion Control	73
9.4.3	Seed and Plant Propagation.....	73
9.4.4	Re-vegetation Monitoring	73

9.5	Implementation Schedule and Costs	74
9.5.1	Closure and Reclamation Schedule.....	74
9.5.2	Financial provision.....	74
9.5.3	Stakeholder Consultation	74
10	MANAGEMENT, MITIGATION, MONITORING AND IMPLEMENTATION MEASURES	75
10.1	MANAGEMENT PLANS	75
10.2	MONITORING PLANS	81
10.2.1	Climate.....	81
10.2.2	Ecology	81
10.2.3	Noise Monitoring.....	81
10.2.4	Surface and Groundwater Monitoring	82
10.2.5	Air Quality Monitoring	82
10.2.6	Community Development Monitoring.....	82
10.3	Environmental Management, Monitoring and Training Costs.....	82
11	BIBLIOGRAPHY	83

LIST OF TABLES

Table 1.1-1: List of Environmental and Social Management Plans for the Project 1

Table 5.2-1: Spill Cleanup methods.....41

Table 7.4-1: CDAP Budget for Developmental Projects over 5 years64

Table 10.1-1: Management Plans and estimated costs 76

ACRONYMS

⁰ C	Degrees Celsius
%	Percentage
"	Inch
Al	Aluminium
AMSL	above mean sea level
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
dB	decibels
DO	Dissolved Oxygen
EC	Electrical Conductivity
EHS	Environmental Health and Safety
EPA-SL	Environment Protection Agency – Sierra Leone
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ERP	Emergency Response Plan
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GoSL	Government of Sierra Leone
GPS	Global Positioning System
HC	Hydrocarbons
HDI	Human Development Index
IFC	International Finance Corporation
IMR	Infant Mortality Rate
IVS	Inland Valley Swamp
JSS	Junior Secondary School
K+	Potassium ions
kg	kilogram
km	kilometre
Km ²	Square kilometre
Le	Leones
m	metre
MDA	Ministries, Departments and Agencies
MFIs	micro-finance institutions

mg	milligram
mg/L	Milligram per litre
mg/m ³	Milligram per cubic metre
mm	millimetre
m/s	Metre per second
N	North
NE	North-east
NGO	Non-Governmental Organization
PAC	Project Affected Communities
PAPs	Project Affected Persons
PCDP	Public Consultation and Disclosure Plan
PM	Particulate Matter
PRSP	Poverty reduction Strategy Paper
RH	Relative Humidity
RPF	Resettlement Policy Framework
Si	Silicon
t	tons
TOR	Terms of Reference
WMP	Waste Management Plan

1 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Volume 1 of the Environmental and Social Impact Assessment (ESIA) contains the policy, legal and administrative framework under which the study was carried out and a description of the project in its geographic, ecological, social and temporal context. Mitigation measures needed to control, avoid, prevent, reduce and repair impacts to acceptable levels are presented, as well as an analysis of the cumulative impacts and feasible alternatives.

The Environmental and Social Management Plan (ESMP) outlined in this volume (Volume 2) presents the environmental management, mitigation, monitoring and institutional measures to be taken during project implementation and operation, to reduce adverse environmental and social effects to acceptable levels and enhance positive effects. This plan provides a framework and requirements/guidance for preparation of a series of sub-plans to be prepared later. It does not present all of the actual individual plans to be implemented. It specifically defines what actions must be taken and who is responsible to reduce adverse project impacts. This ESMP includes several component plans defining specific action programs for waste management, emergency response, closure and reclamation, community development, and public consultation, covering the different phases of the project. The ESMP highlights the issues and concerns that are presented in the ESIA and identifies reasonable and practical responses to address and mitigate potentially adverse effects. It defines the specific actions that will be required to effectively implement those responses in a timely manner and describes the methods by which management will demonstrate that those requirements have been met. It also establishes the course that the project management will follow in complying with Government of Sierra Leone environmental laws and regulations as well as international policies and guidelines.

1.1 Content of ESMP Report

This volume is split into the following subsections listed in Table 1.

Table 1.1-1: List of Environmental and Social Management Plans for the Project

ENVIRONMENTAL HEALTH AND SAFETY PLAN (EHSP)
WASTE MANAGEMENT PLAN (WMP)
PESTICIDE AND CHEMICAL MANAGEMENT PLAN (PCMP)
EMERGENCY RESPONSE PLAN (ERP)
RESETTLEMENT POLICY FRAMEWORK (RPF)
COMMUNITY DEVELOPMENT ACTION PLAN (CDAP)
PUBLIC CONSULTATION AND DISCLOSURE PLAN (PCDP)
CLOSURE PLAN

MANAGEMENT, MITIGATION, MONITORING AND IMPLEMENTATION MEASURES

Environmental Health and Safety Plan (EHSP)

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

Waste Management Plan (WMP)

The Waste Management Plan describes the procedures, systems, equipment, and structures specific to waste management and disposal. Waste generation will be limited at all levels of the operation in order to decrease the volume of waste generated and make waste disposal more manageable. The plan also defines who is responsible for developing and implementing the plan, and what records and reporting will be required.

Emergency Response Plan (ERP)

The Emergency Response Plan (ERP) provides employees and managers with specific instructions that will allow them to respond quickly and efficiently to any foreseeable emergencies likely to occur at the Project. It is developed using recognized and accepted methods and practices, and includes specific responses, protocols, and management contacts. The ERP essentially has the goal of protecting people, the environment, property and the operations. This document deals with typical emergency types that characterize the operation which include.

Resettlement Policy Framework (RPF)

The Resettlement Policy Framework identifies objectives, principles, policies, procedures, organisational arrangements and estimated costs (where possible) for dealing with resettlement and compensation payments related to the implementation of the Project.

Community Development Action Plan (CDAP)

The community development and social assistance programmes aimed at improving the living conditions of the local communities in a sustainable way are captured under the CDAP.

Public Consultation and Disclosure Plan (PCDP)

The PCDP is intended to define objectives and establish the framework necessary to provide understandable information to all parties involved. This plan will be implemented to ensure timely and effective communications between Sierra Tropical Ltd Management and the

affected stakeholders. The main objective of the PCDP is to establish a program for multi-directional communication between the management and stakeholders.

Closure Plan (CP)

The Closure Plan documents plans required to restore the site to a pre project activities state, ensuring that the land can be used in beneficial post-operation land use.

Management, Mitigation, Monitoring and Implementation Measures

Management, mitigation and monitoring measures are presented in this section, which also includes a comprehensive monitoring plan.

Management of Plans

The Management Plans document the systems and processes that will be implemented over time to ensure compliance with local and international standards.

Sierra Tropical will attempt to manage risks in the workplace by applying accepted and systematic risk management principles combined with routine staff training.

2 ENVIRONMENTAL HEALTH AND SAFETY PLAN (EHSP)

2.1 Introduction

The Environmental Health and Safety Plan identifies the principles, approach, procedures and methods that will be used to control and minimize all environmental health and safety impact associated with planned extension project. It is intended to complement the project's Environmental and Social Impact Assessment (ESIA) and is tailored to the hazards and risks established for the project on the basis of the results of the environmental assessment in which site-specific variables, such as host community, employees safety and other project factors, are taken into account; to minimize project related adverse environmental and social impacts throughout the project.

2.2 Environmental, Health, And Safety Guidelines For Perennial Crop Production (IFC)

The EHS Guidelines for perennial crop are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. This section outlines information relevant to large-scale plantation crops and out grower systems and focuses on the primary production and harvesting through farming and plantation forestry of major multi-year food.

The following subsections provide a summary of EHS issues associated with plantation crop production, along with recommendations for their management.

Environmental issues primarily include the following:

- Soil Conservation and Management
- Nutrient Management
- Crop Residue and Solid Waste Management
- Water Management
- Pest Management
- Use and Management of Pesticides
- Fertilizers
- Biodiversity and Ecosystems
- Energy Use
- Air Quality
- Greenhouse Gas (GHG) Emissions

2.2.1 Soil Conservation and Management

Physical and chemical degradation of soils may result from unsuitable management techniques, such as the use of inappropriate machinery or earthworks associated with plantation preparation and infrastructure development. Chemical degradation of soil may result from insufficient or inappropriate use of mineral fertilizers, failure to recycle nutrients contained in crop residues, and failure to correct changes in soil pH that result from long-term use of nitrogen fertilizers and excessive use of poor-quality water, resulting in salinization. Soil erosion may result from poor crop canopy closure after land preparation and lack of soil conservation structures on sloping land planted with perennial crops. Soil loss prevention practices include appropriate use of the following techniques:

- Practice reduced and zero tillage (often known as “low till” or “no till”), as well as direct seeding and planting, to minimize damage to soil structure, conserve soil organic matter, and reduce soil erosion.
- Minimize soil compaction, damage, or disturbance by using appropriate land preparation machinery at the right time of year.
- Use cover crops, intercropping along contours with legumes to create multi-species shelterbelts, and/or windbreaks to reduce evapotranspiration and soil loss through wind and water erosion.
- Replenish soil organic matter by recycling crop residues, compost, and manures.
- Implement earthworks when weather conditions pose the lowest risk of causing environmental damage.
- Employ erosion control management practices (e.g., contour and strip planting, terracing, discontinuous trenching, intercropping with trees, and grass barriers) in sloping areas.
- Draw up mitigation plans for planting or harvest operations that must take place during unsuitable periods.
- Use flow control weirs and diversion canals to reduce erosion in areas with field drainage.
- Restrict the width of roads to the minimum that will provide the means for efficient and safe transport.

The following approaches are recommended to maintain soil productivity over the long term:

- Cultivate crops that are suited to the local climate and soil conditions and adopt good agronomic practices to optimize crop productivity.
- Collect meteorological data on precipitation, evapotranspiration, temperature, sunlight, and use information to inform and guide agronomic management techniques.

- Use soil maps and soil survey results to determine crop suitability and appropriate soil management practices.
- Develop and implement a soil monitoring and management plan that includes soil and terrain mapping and erosion risk identification.
- Conduct regular surveys to monitor soil structure and chemistry in order to identify areas where remedial action is required.
- Recycle and/or incorporate organic materials (e.g., crop residues, compost, and manures) to replenish soil organic matter and improve soil water-holding capacity.
- Minimize the use of pesticides by implementing a pest and disease early warning system, by using biological pest and disease control methods, and by implementing control measures before outbreaks require large-scale control.

2.2.2 Nutrient Management

Nutrient management strategies should aim to maintain and/or improve soil fertility and optimize crop yield while minimizing off-site environmental impact (e.g., contamination of groundwater resources and eutrophication of surface water resources from surface runoff and leaching of nutrients). The following practices are considered:

- Use green manure, cover crops, or mulching techniques to maintain soil cover, reduce the loss of nutrients, replenish soil organic matter, and capture and/or conserve moisture.
- Incorporate nitrogen-fixing legume crop plants and cover crops in the cropping cycle.
- Draw up balanced fertilizer programs for each soil management unit based on fertility results, soil and leaf analysis, and crop assessment.
- Assess EHS risks associated with the nutrient management plan and mitigating strategies to minimize potential adverse EHS impacts.
- Time the application of crop nutrients to maximize uptake and minimize nutrient runoff.
- Assess soil pH periodically and apply soil amendments (e.g., agricultural lime) to correct changes in soil pH as required to ensure that nutrients are available for plant uptake.
- Conduct periodic soil analysis to detect changes in soil fertility, inform decisions on fertilizer application rates, and avoid unsustainable nutrient depletion and over-fertilization.
- Establish and respect setbacks from watercourses—including appropriate buffer zones, strips, or other “no-treatment” areas along water sources, rivers, streams,

ponds, lakes, and ditches— to act as a filter for potential nutrient runoff from the land.

- Select and maintain fertilizer application equipment to ensure desired application rates are used and over broadcasting of solid fertilizers as well as over spraying of liquid fertilizers are minimized.
- Implement nutrient planning and documentation, which includes the use of a fertilizer logbook to record the following information:
 - Dates of purchase, dates of use, amount of fertilizer and nutrient used (kg/ha), purpose of use, and crop growth stage.
 - Weather conditions before, during, and after application.
 - Methods used to minimize nutrient loss (e.g., incorporation into the soil, split applications, irrigation after application).
- Provide farm operators with training in nutrient management following published principles and agricultural practice manuals.
- Ensure that all personnel are trained in and use appropriate management procedures for the storage, handling, and application of all types of fertilizers, including organic wastes.
- Personal Protective Equipment (PPE) should be used according to the Safety Data Sheets (SDS) of the product or to a risk assessment of the fertilizer product. SDS should be available at each management unit.

2.2.3 Crop Residue and Solid Waste Management

In all plantation systems, residues can be recycled beneficially to improve soil organic matter and soil structure, as well as to reduce soil loss. In addition to annual or intermittent residues, many plantation crops also result in major residues at the end of their commercial life. These residues are valuable sources of organic matter and carbon and can lead to the extended release of nutrients during the development (growth) phase of the next crop cycle. Prevention and control strategies for potential risks and impacts include the following:

- Develop and implement a residue management plan in combination with results from nutrient management research and planning.
- Recycle residues and other organic materials by leaving the materials on site or through composting (and spreading).
- Consider the potential for harbouring and spreading pests and diseases before implementing this practice.

- Disperse (or mulch) large vegetative structures (e.g., trunks, branches), unless there are compelling habitat and biodiversity benefits identified in the Biodiversity Management Plan.
- Consider using crop residues for other beneficial purposes—such as animal feed, bedding, or thatching—when leaving residues in the field is neither practical nor appropriate.
- In cases where crop residues are in excess of those needed for nutrient management, consider using as a thermal energy source for agriculture processing or for the generation of heat and/or power. Relatively high atmospheric emissions (such as of particulate matter and carbon monoxide (CO)) are possible when using crop residues for thermal combustion; their handling, storage, and processing may present risks of fire, such as from spontaneous combustion of improperly stored damp residues or explosion of combustible dust. Strategies to prevent and control risks and impacts include:
 - In the planning phase, obtain physical and chemical data on the fuel and implement advice from a qualified specialist.
 - Undertake tests with the “new” residual biomass fuel prior to introducing it, and demonstrate that expert advice and feedback have been followed.
 - Adopt management practices in line with General EHS Guidelines in managing risks for fire and explosion.
- Avoid using harmful residual chemicals at end of crop life when preparing for removal. Non-crop wastes from the production systems (e.g., pesticide containers, waste pesticides, and packaging) often have the potential to contribute to adverse health, safety, or environmental impacts. Considerations for the prevention and control of potential impacts from these wastes include:
- Ensure all packaging for pesticides and herbicides is returned to the farm after use and properly stored until final disposal.
- Do not burn packaging, plastics, or other solid waste. Dispose of this waste in designated waste disposal facilities or by recycling. Manage solid waste in accordance with the General EHS Guidelines.
- Consider large container and/or bulk systems for fuels, oils, fertilizers, and chemicals to reduce the volume of waste containers.
- Examine alternative product formulations and packaging (e.g., biodegradable material).
- Manage expired and unwanted pesticides as hazardous wastes in accordance with the General EHS Guidelines and Food and Agriculture Organization (FAO) Guidelines for the Management of Small Quantities of Unwanted and Obsolete Pesticides.

2.2.4 Water Management

Water management for plantation crop production should aim to conserve the quantity and quality of water resources while optimizing crop yield. Surface or groundwater resources used for irrigation should be managed in accordance with the principles of Integrated Resource Water Management, consistent with the following recommendations:

- Determine rain or water irrigation requirements of the crop, based on internationally recognized guidelines, while recognizing seasonal variations and regional norms. When irrigation is practiced, develop an appropriate irrigation plan and schedule, and monitor consumption and compare regularly with these targets which should be based on available supplies of water.
- Maintain soil structure and soil organic matter. Use of crop residues and mulches will assist in maintaining soil organic matter levels, retaining soil humidity, and reducing surface evaporation.
- Maximize the retention of rainwater through appropriate “rain harvesting” techniques, which may include:
 - Diverting water flow from roads and paths toward crops, thus storing water in the soil and reducing the effect of short dry spells.
 - Storing runoff from rainy periods for use during dry spells by using tanks, ponds, cisterns, and earth dams.
 - Controlling weeds through the use of cover crops, mulching, or herbicides to encourage beneficial but low-water-use soil cover plants.
 - Maintain protective vegetation in canals and drainage systems to reduce canal bank scouring and slow runoff.

When irrigation is used, implement irrigation water conservation techniques, such as:

- Ensure regular maintenance of the irrigation system, as well as that of its associated channels and infrastructure.
- Maintain a water management logbook that records the time and quantity of rainfall evaporation, as well as the amount of irrigation applied and soil moisture levels (%), in order to verify both that irrigation is being used according to crop need and to develop an understanding of long-term trends in water use.
- Reduce evaporation by avoiding irrigation during periods when evaporation is elevated (e.g., in periods of higher temperatures, reduced humidity, or high winds). Use trickle or drip irrigation techniques (if practical), or install “under canopy” rather than overhead sprinklers.
- Reduce evapotranspiration by using shelterbelts and windbreaks. Reduce seepage losses in supply channels by lining them or using closed pipes.
- Consider collecting storm water through catchments.

- Employ a cutback furrow irrigation technique, slowing or stopping irrigation water well before the water reaches the end of the furrow and discharges to the environment.
- If herbicides are used, ensure they are applied at the appropriate time of year to most effectively control undesirable vegetation and reduce its water consumption.

The following measures are recommended to prevent and control the contamination of water sources:

- Avoid over-irrigation, which may result in the leaching of nutrients and contaminants.
- Ensure appropriate soil moisture by active monitoring of soil humidity.
- Use harvesting methods or other appropriate measures to minimize the amount of debris deposited in streams.
- Establish and respect setbacks and buffer zones in riparian areas. Buffer widths should be based on the specific risk, land management regime, and slope of the area.
- Install sediment traps to prevent entry into water ways. Sediments may become a significant pollutant due to their physical and chemical properties. Suspended sediments in surface water carry pollutants such as pesticides, nutrients, and trace metals, affecting water quality. Sediment loading reduces storage and flow capacities of streams, lakes, and reservoirs; may adversely affect water supplies; and increases the risk of flooding. Soil loss prevention practices are presented in the "Soil Conservation and Management" section.

2.2.5 Pest Management

The primary aim of pest management should not be to eradicate all organisms, but to manage “pests,” including insect pests, diseases, and weeds that may negatively affect plantation crops so that they remain at levels beneath an economically and environmentally damaging threshold. Pests should be managed through a process of integrated pest management (IPM) that combines chemical and non-chemical approaches to minimize pest impact, while also minimizing the impact of such measures on the environment. Pesticides should be used only to the extent necessary under an IPM and integrated vector management (IVM) approach, and only after other pest management practices have either failed or proven inefficient. The following steps should be considered and documented in an integrated pest/vector management plan:

- Identify the main pests affecting crops in the region, assess the risks to the operation, and determine whether a strategy and capacity is in place.
- Where possible, apply early-warning mechanisms for pests and diseases (i.e., pest and disease forecasting techniques).

- Select resistant varieties and use the cultural and biological control of pests, diseases, and weeds to minimize dependence on pesticide (chemical) control options. An effective IPM regime should: Identify and assess pests, threshold levels, and control options (including those listed below), as well as risks associated with these control options.
 - Promote the use of fallow period to reduce the presence of insects, disease, or weeds in the soil or crop ecosystems.
 - Support beneficial bio-control organisms—such as insects, birds, mites, and microbial agents—to perform biological control of pests (e.g., by providing a favourable habitat, such as bushes for nesting sites and other original vegetation that can house pest predators and parasites).
 - Favour manual, mechanical weed control and/or selective weeding. Use animals to graze areas and manage plant coverage.
 - Employ mechanical controls—such as traps, barriers, light, and sound—to kill, relocate, or repel pests.
 - Use pesticides to complement these approaches, not replace them.
 - Prior to procuring any pesticide, assess the nature and degree of associated risks and effectiveness, taking into account the proposed use and the intended users.

2.2.5.1 Pesticides Use and Management

Where pesticide use is warranted, in order to prevent, reduce, or control the potential contamination of soils, wildlife, groundwater, or surface water resources caused by accidental spills during transfer, mixing, storage, and application, pesticides should be stored, handled, and applied in a manner consistent with the recommendations for hazardous materials management presented in the General EHS Guidelines. A pesticide management plan (PMP) that includes procedures for the selection, procurement, storage, handling, and ultimate destruction of all out-of-date stocks should be prepared in accordance with FAO guidelines and should be consistent with country commitments under the Stockholm, Rotterdam, and Basel Conventions. The PMP prescribes the type of pesticides to be used, as well as the purpose of their use, and outlines best practice for the procurement and storage of all pesticides. Personnel must have appropriate training—including certification, where relevant—to handle and apply pesticides safely. In particular:

- Ensure that any pesticides used are manufactured, formulated, packaged, labelled, handled, stored, disposed of, and applied according to the FAO's International Code of Conduct on Pesticide Management.
- Do not purchase, store, use, or trade pesticides that fall under the World Health Organization's (WHO) Recommended Classification of Pesticides by Hazard

Classes 1a (extremely hazardous) and 1b (highly hazardous), or Annexes A and B of the Stockholm Convention.

- Do not use pesticides listed in WHO Hazard Class II (moderately hazardous), unless the project has appropriate controls established with respect to the manufacture, procurement, or distribution and/or use of these chemicals. These chemicals should not be accessible to personnel without proper training, equipment, and facilities in which to handle, store, apply, and dispose of these products properly.
- Preferentially, use selective pesticides, where appropriate, rather than broad-spectrum products to minimize impacts on non-target species.

2.2.5.2 Storage

Recommended pesticide storage practices include:

- Store all pesticides in a lockable, bonded container or store that has sufficient space in which to capture any spills without contaminating the environment. Stores should be set away from water sources, residential and built-up areas, as well as livestock and food storage areas.
- Procure spill kits and institute suitable control measures in case of accidental spillage.
- Store all pesticides in their original, labelled containers and ensure that storage instructions are followed.
- Keep a register of all pesticides procured, recording when they were received, the amount used, the amount remaining in store, and their location.
- Keep SDS at appropriate locations in storage facilities.
- Warehouses must have appropriate ventilation, secondary containment, and emergency showers and kits.

2.2.5.3 Handling

- Operators must read, understand, and follow product label directions for mixing, safety, application, and disposal; use trained personnel for critical operations (e.g., mixing, transfers, filling tanks, and application).
- Insist that correct PPE (e.g., gloves, overalls, eye protection) for each exposure route¹⁸ listed in the SDS be worn at all times when handling and applying pesticides.
- Mandate that any mixing and filling of pesticide tanks occur in a designated filling area. This should be set away from watercourses and drains.

- If on concrete, water should be collected in a separate sump and disposed of as a hazardous waste.
- Ensure that spills are cleaned up immediately using appropriate spill kits; spills should not be washed away into watercourses or drains.

2.2.5.4 Application

- Give preference to the application method with the lowest EHS risk and ensure non target organisms are not affected.
- Select pesticide application technologies and practices designed to minimize off-site movement or runoff (e.g., low-drift nozzles, using the largest droplet size and lowest pressure that are suitable for the product).
- Establish buffer zones around watercourses, residential and built-up neighbourhoods, as well as livestock and food storage areas.
- For the aerial application of pesticides, the boundaries of target areas should be clearly demarcated and all possible nearby communities, livestock, and rivers should be identified in the flight plan. The aerial application of pesticides should not be conducted where there is potential for contamination of organic or otherwise certifiable production. Ensure that all equipment is in good condition and properly calibrated to apply the correct dosage.
- Insist that applications occur under suitable weather conditions; avoid wet weather and windy conditions. Disposal
- Any unused dilute pesticide that cannot be applied to the crop, along with rinse water, and out of-date or no-longer approved pesticides should be disposed of as a hazardous waste, as per FAO guidelines.
- Empty pesticide containers, foil seals, and lids should be triple rinsed, and washings used in the pesticide tank should be sprayed back onto the field or disposed of as hazardous waste in a manner consistent with FAO guidelines and according to the manufacturer's directions. Containers should be stored safely and securely under cover prior to their safe disposal; they should not be used for other purposes.

2.2.6 Fertilizers

- Store fertilizers in their original packaging and in a dedicated location that can be locked and properly identified with signs, access to which is limited to authorized persons.
- Ensure that SDS and inventories are available at fertilizer storage facilities and available to first responders when necessary.

- Only purchase and store minimal fertilizer requirements, and use older fertilizers first.
- Keep fertilizer stores separate from pesticides and machinery (e.g., fuels, ignition, or heat sources).
- Know and understand each crop's fertilizer requirements and only apply what is required, when it is required, to minimize losses to the environment.
- Implement a suitable training program for personnel that are transporting, handling, loading, storing, and applying fertilizers.

2.2.7 Biodiversity and Ecosystems

Perennial crop production has the potential to have a direct and indirect impact on biodiversity and ecosystems. Key direct impacts relate to habitat conversion or degradation, water usage, pollution, introduction of invasive species, inappropriate cultivation techniques, and quality and or availability of priority ecosystem services. Indirect impacts relate to immigration, and induced changes to access for traditional land uses (including hunting, fishing, and recreation). Impacts and associated mitigation activities related to biodiversity and ecosystems are primarily specific to the crops, techniques, and existing land use context at any specific site. Impact avoidance should be the goal. Appropriate site selection, including expansion planning, is the single most important impact avoidance measure available to plantation crop production.

2.2.8 Energy Use

Energy is used in perennial crop production for site preparation, cultivation, management, irrigation, harvesting, transport, lighting, heating, cooling, and ventilation. Recommendations to reduce energy use and increase efficiency are:

- Select energy-efficient machinery and equipment (e.g., tractors, ventilation systems, drying and storage systems, cooling devices) and consider on-board fuel-use monitors.
- Consider implementing training programs to make operators aware of energy-efficient practices when using machinery (e.g., switching off engines when waiting to load) and when driving.

Irrigation energy use can be significant: the following techniques are recommended for efficient use of energy in irrigation systems:

- Develop an irrigation plan that is appropriate for climate, season, soil conditions, plant materials, and grading. This plan should include optimum scheduling, monitoring, and recording systems so that energy usage and efficiencies can be examined. An irrigation logbook or database should be maintained so that

quantitative measures are recorded (e.g., kWh electricity per cubic meter applied, fuel usage as litre per cubic meter applied).

- Regularly maintain the irrigation system and associated infrastructure, such as supply channels and water storage.
- Select efficient pumps.
- Ensure properly matched pumps, systems, and power sources by keeping a good record of the amount of water pumped and the energy used to ensure suitability.

2.2.9 Air Quality

Atmospheric emissions are primarily associated with emissions of combustion by-products—including carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxide (NO_x), and particulate matter (PM)—resulting from the operation of mechanized equipment or from combustion by-products from the disposal or destruction of crop residues or processing by-products. The impacts of these pollutants depend on the local context, including the proximity to communities, sensitivity of ecosystems, concentrations of the pollutant, topography, and meteorology.

Air-quality issues, including management of mechanized farm equipment, should be managed according to recommendations in the General EHS Guidelines for mobile and stationary sources. Specific recommendations for perennial crop production to prevent and control air emissions are:

- Avoid open burning for land preparation, weed control, and post-harvest treatments. Where burning is unavoidable, potential impacts should be identified and weather conditions monitored to schedule burning in an effort to minimize impacts.
- Prohibit burning of pesticide-treated agricultural wastes and by-products (e.g., pesticide containers) to avoid unintended emissions of persistent organic pollutants (POPs).
- Reduce the risk of fire by reducing the build-up of potential fuel sources and controlling weeds and invasive species. Where controlled burns of residues are necessary, ensure optimal conditions for the low risk of spread and low impact on existing air quality.
- Modify field operations where possible (e.g., reducing the number of in-field passes with machinery, reduced tillage operations, or improved logistics to minimize travel distances).
- Modify timing of operations, where possible, to coincide with favourable atmospheric conditions and reduced risk of air pollution.

- Establish cover crops where possible; retain residues, and reduce tillage intensity to avoid dust and soil degradation due to wind erosion. Where water supplies are ample, water application to cropped areas and access roads may reduce the risk of airborne dust.
- Establish natural wind barriers—such as vegetative field borders, hedgerows, herbaceous wind barriers, and tree/shrub establishment—to intercept airborne particulate matter and droplets, which may also include contaminants.

2.2.10 Greenhouse Gas (GHG) Emissions

Perennial crop production produces GHG emissions, including methane, nitrous oxide, and carbon dioxide from different stages in the production cycle. Carbon is also stored in the crop's residual biomass above and below ground, as well as in the soil ecosystem. The primary sources of GHG emissions during site preparation for perennial crops will be carbon dioxide associated with land use change. During the production phase, emissions are nitrous oxide from fertilizer use and carbon dioxide from on-farm fuel and electricity use. Emissions from fertilizer come from both the manufacture of the product and from the application of the product to the crop, with both activities resulting in nitrous oxide emissions, which have a high global warming potential. These emissions should be managed through resource-efficient farming.

The following are recommended measures for minimizing GHG emissions from crop production:

- Follow the nutrient management plan to ensure that the nutrient balance is right for maximum crop uptake, the quantity of nitrogen matches crop needs, and the timing of application coincides with active growth stages.
- Follow Good Agricultural Practices (GAP) manual for the use of fertilizers.
- Where available, use abated nitrogen fertilizers, which have lower GHG emissions associated with their manufacture, or use nitrification or urease inhibitors, which reduce soil emissions.
- Reduce fossil energy use through adopting energy-efficient production and management practices.

Where feasible, consider using renewable energy (e.g., solar, wind, biofuel) for crop drying or to power irrigation pumps.

2.3 Sierra Tropical Ltd's Plans for Environmental Management

Practices carried out throughout the pineapple production cycle, will strictly comply with the Dole Good Agricultural Practices Manual to ensure sustainability, protection of the

environment, the villages and people living in the vicinity, safety, and necessary standards at all phases of the operations.

The following environmental considerations shall be incorporated into the project development:

- The present contours and current land configuration of the areas identified in and around Sumbuya shall be maintained. Only areas with slopes 0% to 18% shall be considered for cultivation. These areas will remain in their natural configuration.
- During land preparation, there shall be no major earth moving, so as to preserve the configuration of the area that has been established through the years.
- Vegetation will be cleared only where required, and provision will be made maintenance of natural buffer zones.
- Where ever possible, all identified cultivation areas shall undergo minimum tillage. In addition, Conservation agriculture will be practiced where applicable and will be the standard practice after the initial land preparation cycle. Land preparation in pineapples is done only once every three years. This implies 5-8 times less soil disturbance when planted to pineapple.

The following table highlights possible impacts, their likelihood to occur and their controls:

ACTIVITIES	IMPACTS	MITIGATING MEASURES
Land Preparation	Land, Air and People	<ul style="list-style-type: none"> • Areas cultivated shall only range from 0-18% slope • No modification of the natural terrain or contours • The timing of land preparation shall be during the dry season. • The planting of trees along the ends of the plantation as “greenbelts” and drainage flows to retard the flow of rain water. • Soil erosion prevention practices to be strictly implemented. • Temporary rerouting of vehicles from the land prep areas • Wearing of necessary protective equipment
Planting	People	<ul style="list-style-type: none"> • Wearing of necessary protective clothing i.e. gloves and boots, dust masks.
Pest and Weed Control	Land, Water, Air and People	<ul style="list-style-type: none"> • Wearing of protective clothing, boots, gloves and masks • Exclusive use of allowable chemicals based on the standards of the Ministry of Agriculture GoSL and Dole’s list of approved chemicals for pineapple production • Conduct training and orientation on proper chemical handling and application • Conduct of active monitoring in the proper disposal of pesticide containers

Fertilization	Land, Water, Air, and People	<ul style="list-style-type: none"> • Wearing of protective clothing, boots, gloves and masks • Exclusive use of allowable chemicals based on the standards of the Ministry of Agriculture GoSL and Dole's approved chemicals for pineapple production. • Conduct of training and orientation on proper chemical handling and application • Conduct of active monitoring in the proper disposal of fertilizer containers
Forcing (Process to initiate fruit development)	Land, Water, Air and People	<ul style="list-style-type: none"> • Wearing of protective clothing, boots, gloves and masks • Exclusive use of allowable chemicals based on the standards of the Ministry of Agriculture GoSL and Dole's approved chemicals for pineapple production. • Conduct of training and orientation on proper chemical handling and application • Conduct of active monitoring in the proper disposal of containers
Knockdown Operations(to prepare for a new crop cycle)	Land	<ul style="list-style-type: none"> • Areas shall only range from 0-18% slope • No modifications of the natural terrain • Plant waste and residues shall be left in the field to decompose and serve as an organic mulch and matter for succeeding cropping • Timing of land preparation shall be during the dry seasons.
Road Construction	Land and Air	<ul style="list-style-type: none"> • Temporary rerouting of vehicles from the land prep areas • Wearing of necessary protective equipment, masks and ear plugs.

Once the plantations have been established and operations are underway, the following shall apply:

ACTIVITIES	IMPACTS	MITIGATING MEASURES	PERSON RESPONSIBLE
a. Land Preparation	Land, Air and People	<ul style="list-style-type: none"> Equipment to be used for the land preparation shall be the regular agricultural land preparation equipment. Appropriate safety precautions shall be adopted so as to minimize effects of the operation to the workers, community and the environment. Land preparation shall be done during the dry seasons to minimize soil damage and erosion. 	Sierra Tropical Ltd
b. Weed and pesticide application	Land, Water, Air and People	The application of herbicide shall only be limited during the plantation establishment when the plants are still small. Succeeding weeding maintenance shall be manual so as to minimize the use of herbicide. Minimal application of	Sierra Tropical Ltd.
		insecticide is done during the early stage of plant growth. The application is optional when there is no insect pressure.	
c. Fertilization	Land, Water, Air, and People	On the average, there are 24 bags of fertilizer applied per hectare per year.	Sierra Tropical Ltd.
d. Forcing application (to initiate fruit growth)	Land, Water, Air, and People	The use of urea and Ethryl during forcing period applied to the heart of pineapple plant. A natural product, it and does not affect the soil and the surrounding environment.	Sierra Tropical Ltd.
e. Harvesting	Land, Water, Air and People	Manual hand pick/hand load are practiced during the harvesting period. The only use of machinery is limited to the transportation of fruit to the cannery.	Sierra Tropical Ltd.

General implementation of mitigation measures are as follows:

LIST OF MITIGATING MEASURES	HOW TO IMPLEMENT THE MEASURE	RESPONSIBLE PERSON
Strict adherence to the selection process of areas	Selection criteria shall be formulated to include slopes less than 18%. The natural contours shall be retained and there shall be no modification of the natural terrain, or clearing of Primary Forest.	Sierra Tropical Ltd.
Tree Planting	The present trees in buffer zones, along waterways etc. shall be preserved and enriched with new stocks to stabilize the natural drainage systems of the farms. A central nursery shall be established to provide a steady supply of seedlings for the	Sierra Tropical Ltd.
	tree-planting component.	
Vetivier and other grass planting	Steep slopes and erosion-prone areas shall be planted to grass to help stabilize the slopes while waiting for the trees to grow to full maturity.	Sierra Tropical Ltd.
Operational Safety Procedures and Training	Training, orientation and monitoring on the proper disposal of fertilizer and pesticide containers shall be applied throughout the operation in order to eliminate and minimize the possible effects of these inputs to the workers and the community	Sierra Tropical Ltd.

2.3.1 Environmental Initiatives

2.3.1.1 Buffer zones

Buffer zones shall be established between the project and the following:

- Residential houses/villages and other public structures
- Minor waterways
- Major rivers

The distances for these buffers will be determined by the client and be subject to approval by EPA-SL.

2.3.1.2 Tree planting programs

Sierra Tropical shall implement environmental programs within the proposed project sites. The proponent shall establish nurseries that shall provide seedlings and planting materials for the reforestation and rehabilitation programs in the site.

Specifically, tree planting along waterways, riverbank rehabilitation, erosion control, environmental protection practices and policy compliance will be undertaken and observed.

Tree planting programs will be established in partnership with the local community residents in conjunction with environmental awareness shall form part of the proponent's programs.

The project shall closely coordinate with schools located in the project sites in implementing the above-mentioned environmental protection programs.

2.3.1.3 6.3 Biodiversity Study or High Conservation Value (HVC) Assessment

Before any major work at the proposed site is undertaken a comprehensive HVC study will be undertaken. This study will focus on

- a) Identifying all existing natural ecosystems within the new plantation and immediate surroundings.
- b) Documenting the existing collection and count of flora (vegetation), fauna (animals), micro flora and fauna (plants and animals) among the identified new plantation areas and immediate surrounds.
- c) Establishing biodiversity monitoring stations within the new plantation area and immediate surrounds.
- d) Using the baseline data collected for a possible program of Restoration, Protection, and Conservation in the new plantation as well as the establishment of a Botanical Garden within the plantation.

2.4 Occupational Health and Safety Plan

2.4.1 Occupational Health and safety: IFC Environmental, Health, and Safety (EHS) Guidelines.

Sierra Tropical Ltd will implement various safety management strategies to minimize workplace hazards and to ensure a safe working environment.

Occupational health and safety issues include:

- Physical hazards
- Chemical hazards
- Community Health and Safety

2.4.1.1 Physical Hazards

Operators and workers are at risk of impacts associated with equipment, machinery, and vehicles accidents or exertion of work, which can be physically demanding and often compounded by the presence of repetitive motion. Exposure to the physical hazard (rotating and moving equipment, vibration, manual handling etc.) can lead to a range of injuries: near miss/ close call, medical treatment injuries, property damages or fatality.

Prevention and control of exposure to physical hazards include the following:

- Hazard and Risk Identification, reporting, assessment, and control;
- Communication of safety information;
- Provide continuous access to safety information;
- Tool Box Meetings;
- Start Up Meetings;
- Safety Alerts and Bulletins; and
- Issuing of Work Permits where applicable.

2.4.1.2 Chemical Hazards

Exposure to pesticides is similar to those for other hazardous substances; potential exposures can be either acute or chronic. The effect may be increased by climatic conditions, such as the wind, which may increase the chance of unintended drift, or high temperatures, which may be a deterrent to the use of personal protective equipment (PPE) by the operator.

Prevention and control of exposure to pesticides include the following:

- Training of personnel in the application of pesticides and ensuring that personnel receive the necessary certifications or equivalent where such certifications are not required;
- Respect routine treatment intervals for chemical application. This will reduce the exposure of operators.
- Respect pre-harvest intervals to avoid operator exposure to pesticide residues on products during harvesting;
- Ensure hygiene practices are followed to avoid exposure of family members to pesticides residues.

2.4.1.3 Community Health and Safety

Pesticides may affect the community in the same way as it does affect individual operators, through dermal contact or through inhalation of such chemicals as a result of the application. The potential for community exposure to pesticides in the environment may be considerably

influenced by climatic conditions, such as wind velocity, while the potential for exposure to residual levels in post-harvest products may depend on adherence to pesticide use instructions. There may also be a risk to the community caused by dermal contact with residues in containers, packaging, etc. While odours from manure, especially during application, are not generally hazardous, they can be a serious source of discomfort to the community. Open burning of residual organic crop waste can create harmful air emissions for surrounding communities.

Specific recommendations include the following:

-
- Use biological or safe products, as reasonably as possible;
- Do not store or transport pesticides and fertilizers with food or beverages (including drinking water);
- Ensure that animals and unauthorized people are not present in the areas where pesticides are handled or applied;
- Store manure as far away from dwellings as possible, and use measures, such as covering the manure, to reduce odours and atmospheric emissions;
- Clean (e.g., a triple rinse or pressure technique) and dispose of pesticide packaging and containers to ensure that they are not subsequently used as containers for food or drinking water;
- Open burning of residual; organic crop waste should be avoided. Crop waste should be returned to the fields to enhance the nutrient content of the soil.
- Opportunities for use of crop waste as a fuel for energy generation should be considered, where feasible, including composting to create biogas.

2.4.2 Risk Assessment and Evaluation

The following risks are typical to an industrial project and need to be mitigated in order to minimise the risks associated with the operation. All work carried out will comply with:

➤ *Manual Handling*

Supervisors are required to identify manual handling hazards and do what is reasonably practicable to prevent injuries occurring.

➤ *PPE*

PPE will be made available to plantation workers to limit exposure to chemicals used in planting activities, guard against dangerous animals such as snakes, etc. Where required, the following will be provided:

- Chemical resistant gloves (not leather or cloth)

- Rubber boots
- Overalls
- Appropriate respiratory mask

➤ *First Aid Facilities*

Adequate first aid facilities will be maintained in appropriate locations for the treatment of injuries. Qualified nurses who are appointed to operate the First Aid facilities shall keep adequate records of all treatment and medication supplied.

➤ *Traffic Management*

The project will involve the rehabilitation of roads and expansion of existing footpaths into access roads to facilitate movements within the project area. This will result in increased movement of vehicles and machinery which poses a safety risk to community inhabitants unaccustomed to such conditions.

Traffic safety sensitization talks will be organised for communities to alert them to the dangers and educate them on basic road safety rules. Drivers will also be trained regularly on observing the rules of the road. Signs on speed limits will also be set up within the concession indicating maximum allowable speeds of 25Km/h.

➤ *Dust Management*

Dust is expected to be generated during land preparation and also through the movement of vehicles along project roads. Site watering will be implemented to minimise dust levels when necessary.

➤ *Machinery Guarding*

No electrical, mechanical and pneumatic machinery are to be operated unless all guards and/or barricades are in good condition and secured in the correct location and the equipment is in good working order.

2.5 Effective Organization and Management Responsibilities

It is important to delegate Environmental and Occupational Health and Safety (EHS) issues to qualified personnel who will be responsible for ensuring not only adherence, but motivating the workers to actively engage in their work in a safe manner. Assigning a member of staff or committee of workers to EHS issues, marks the first step in managing risks inherent with the expansion of the project and creates a mechanism by which management can monitor improvements.

1.1.1 Environment Health and Safety Officer

The EHS Officer is the appointed individual responsible for ensuring the on-going improvement of health and safety in the work place. He will ensure that all reasonable

measures are taken to make provision for equipment and resources to be at the disposal of workers across the plantations. Where resources are inadequate, he will be responsible for ensuring that senior management is made aware of this.

Specific responsibilities include but are not limited to the following:

- Ensure the on-going improvement of health and safety standards by ensuring regular inspections are undertaken and participating in Occupational Health and Safety (OHS) meetings and training as required;
- Review OHS policies and plans as required;
- Ensure compliance with legislation, company standards and internal procedures;
- Ensure that employees and their representatives are consulted during development and review of policies and procedures or when changes to work practice may impact on their OHS;
- Take action to immediately rectify any unsafe situations or acts and undertake appropriate disciplinary action against persons who fail to comply with reasonable expectations;
- Prepare a list of emergency contacts;
- Maintain the inventory of safety equipment and supplies;
- Arrange for the replacement of used or obsolete safety supplies and equipment;
- Organize and train personnel in first aid;
- Oversee first response programs;
- Maintain records on emergencies or fatalities
- Report to regulatory agencies and stakeholders.

1.1.2 Medical Assistance

First aid kits will be made available on site to handle all cases of minor accidents and incidents. Referrals will be made to hospitals for severe cases needing the attention of a medical doctor. The First Aider assists with upgrading first aid programs drawn up by the EHS Officer, training employees in basic first aid procedures and in responding in the unlikely event of a critical or life-threatening emergency.

1.1.3 Training and Communications

Supervisors will be responsible for determining the overall training and information that is required for staff working on the plantations. Effective communication systems are critical to

minimizing risks and taking a proactive lead in the event of an emergency during the operation of the project.

1.1.4 Hazard Recognition

Employees will undergo formal safety training and task training on techniques in hazard identification and recognition. The training will also identify potential hazards associated with their daily activities. Rapid recognition of potentially hazardous situations can avert an emergency. **Periodic** safety meetings will be held among elected staff members to discuss a broad range of health and safety topics.

1.1.5 Emergency Response Training

The EHS Officer will coordinate emergency response training. Training for all staff can take the form of tool box talks, safety and environmental inductions or first aid training programs, and will include training on handling of chemicals, first response and first aid techniques.

All staff will participate in annual training to ensure that all members are trained in equipment use and emergency response methods.

1.1.6 Employee Responsibility

All employees are obliged and empowered to identify, report and where appropriate, manage potential hazards. Also, employees are responsible for ensuring they do not adversely affect their own health or the health and safety of others through any act or omission. They are obliged to:

- Report all incidents and hazards;
- Wear and maintain provided PPE;
- Operate & maintain machinery in a safe and practical manner;
- Follow all reasonable work instructions and procedures; and
- Comply with company policies & procedures

3 WASTE MANAGEMENT PLAN (WMP)

3.1 Introduction

The WMP describes Sierra Tropical Limited commitment to taking all necessary steps to ensure that the generation, collection, separation, storage, transportation and disposal of all wastes generated during all phases of project operations will be conducted in a safe, efficient and environmentally responsible manner. The WMP detailed in this document considers:

- i. Proposed disposal methods; and
- ii. Equipment and staff.

3.2 Objectives of the Waste Management Plan

The objectives of the WMP are to:

- i. Generate the least possible amount of waste through reduction, reuse and recycling practices, and review/approve all orders for materials, chemicals, and supplies to limit the environmental impact;
- ii. Protect the health and safety of people;
- iii. Avoid or mitigate any potential negative impacts on all elements of the environment – including, but not limited to, people, flora, fauna, air, surface and groundwater resources, and the sea;
- iv. In compliance with Good Agricultural practices, process the waste through treatment and disposal;
- v. Ensure due diligence is followed by all project personnel;
- vi. Track waste generation, handling and disposal to assess whether waste management is being carried out as per the WMP and its associated directives;
- vii. Avoid costly clean-up through prevention;
- viii. Ensure a logical and efficient plan for waste collection, sorting and disposal that reduces the number of times the waste is handled and that produces income for local people through sales of recycled waste.

3.3 Waste Identification/Type of Wastes

Various waste streams that would be generated during nursery preparation and plantation cultivation include the following:

- i. Nursery and plantation development waste (shrubs, stumps, vegetation etc.)
- ii. Domestic waste (paper, empty cartoon/boxes, food, packaging, plastic bottles etc.);
- iii. Biodegradable waste (agricultural waste);

- iv. Hazardous Waste (waste oil, oil filters etc. from machinery, medical waste, batteries,);
- v. Sewage/Human waste (Faeces, urine, tissues etc.)
- vi. Liquid waste (oil filters, waste oil, engine oil, petroleum products)
- vii. Agrochemicals (fertilizers, pesticides, herbicides etc.)

3.4 Waste Handling and Disposal

The following handling procedures, developed based on IFC's guidelines for Waste Management Facilities (2007), will be adopted as part of the Project's waste management program.

Waste collection, handling, and transport guidelines include, but are not necessarily limited to, the following:

- i. A routine schedule will be established for domestic waste collection and disposal;
- ii. Waste generators will be provided with appropriate waste disposal containers;
- iii. Wastes will be segregated at source in order to simplify the disposal process, using colour coded and labelled bins.
- iv. Enclosed refuse vehicles or vehicles equipped with tarps will be used for the domestic waste collection;
- v. Waste handling will be minimized during operations; and
- vi. Waste containment will be maximized during operations.

Odours and the loss of wastes will be monitored, evaluated, and reduced at all waste loading and unloading facilities. Fugitive refuse (for example, plastic bags and paper) around the waste facility will be picked up, disposed of in the waste facility, and properly covered.

3.4.1 Reuse, Recycling and Minimization of Waste Generation

STL will establish programs for material recycling and reuse in order to reduce the volume of materials generated and requiring disposal.

Materials that can be safely reused or recycled will be donated to members of staff or community residents, such as scrap materials, wood and steel, used tires, used vehicle parts, empty containers and other materials, which are no longer required or capable of repair for reuse in the operation. These materials will be carefully screened and cleaned, and determined by the EHS Officer to be fit for safe and beneficial use by residents.

The following steps are involved in carrying out these donations:

- i. Identification of wastes to be recycled/reused;
- ii. Provision of cleaning and treatment as needed to make wastes suitable for recycling;

- iii. Designation of a storage area for recyclable materials, segregated from other waste materials, and located for easy access; and
- iv. Identification of local residents who have been authorized to collect, recycle and salvage materials.

3.4.2 Housekeeping:

- All work areas (offices and plantations) will be maintained in a tidy state, free of debris and rubbish;
- In cases where an inadequate standard of housekeeping has developed and compromised safety and cleanliness, the EHS Officer shall notify the relevant supervisor to halt work until the area has been tidied up and made safe;
- The EHS Officer, supervisors and site safety officers shall carry out regular scheduled health and safety/ housekeeping inspections to ensure maintenance of satisfactory standards; and
- All employees shall be sensitized in waste management methods.

3.5 Types of Waste

3.5.1 Domestic Waste

A variety of domestic waste will be generated during this development phase of the project. These materials may include, but are not limited to aluminium, glass, plastic, paper, cardboard etc. Provision will be made on-site of sealed and labelled waste receptacles for the storage of these wastes. The receptacles will be emptied on a scheduled routine, e.g. daily, weekly, and will be collected or disposed of by a licenced waste management company.

Alternatively, a landfill area could be identified within the concession for the disposal of domestic and inert wastes.

3.5.2 Hazardous Wastes

Hazardous wastes are materials considered reactive, flammable, radioactive, corrosive and/or toxic. Hazardous wastes which may possibly be generated by this project include some or all of the following:

- i. Liquid Waste-waste/used oil from machinery;
- ii. Fuel and oil filters from machinery;
- iii. Medical or First Aid wastes;
- iv. Pesticides and chemicals.
- v. Electronics and fluorescent bulbs

If the generation of hazardous waste cannot be prevented, Management should focus on the prevention of harm to health, safety, and the environment, according to the following additional principles:

- Understanding potential impacts and risks associated with the management of any generated hazardous waste.
- Hazardous waste storage activities should also be subject to special management actions, conducted by employees who have received specific training in handling and storage of hazardous wastes

As Sierra Tropical Limited (STL) will not in this initial phase have the facilities to treat hazardous wastes, it will be ensured that all such wastes are disposed of in labelled waste bins and kept separate from non-hazardous wastes.

Hazardous waste will be stored so as to prevent or control accidental releases to air, soil, and water resources in locations where:

- Waste is stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatibles or physical separation such as walls or containment curbs
- Store in closed containers away from direct sunlight, wind and rain. Secondary containment systems should be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment
- Provide adequate ventilation where volatile wastes are stored.

Hazardous waste storage activities will also be subject to special management actions, conducted by employees who have received specific training in handling and storage of hazardous wastes:

- Provision of readily available information on chemical compatibility to employees, including labelling each container to identify its contents
- Limiting access to hazardous waste storage areas to employees who have received proper training and wearing appropriate PPE.
- Conducting periodic inspections of waste storage areas and documenting the findings

Preparing and implementing spill response and emergency plans to address their accidental release.

Some specific categories of hazardous waste are listed in the following sections:

3.5.2.1 Wastes, Used Oils, Fuels and Solvents

Used oils and spent solvents will be generated by maintenance activities performed on various machinery. Waste oils and solvents will be stored in collection tanks, and carted to

the main facility for safe storage. Used oil can also be re-used in chainsaws and old machinery. A storage tank will be used to collect the oil spillage from the machinery and other equipment.

The EHS Officer's responsibilities include ensuring that oil, fuel, and solvent wastes generated are recycled or stored in an appropriate manner until it can be safely disposed of. The company will reuse as many materials as possible to reduce wastes; incineration will be considered in the later stages of the project. His other responsibilities include the following:

- Explain procedures on proper management, handling, and disposal of waste oils and solvents;
- Explain what is and is not acceptable disposal of waste oils and solvents;
- Put personnel in charge of monitoring the waste oil storage areas.

3.5.2.2 Fuel and Oil Filters

Waste fuel and oil filters from machinery and equipment will be generated throughout the Project life and will be disposed of by:

- Puncturing the filters and allowing them to drain for 8 hours;
- Collecting the drained fuel or waste oil;
- Properly storing for later removal from the site.

Recycling is the preferred method for the recovered fuels and oils. Once puncturing and draining of the filter itself is completed, it will be disposed of in the hazardous waste storage container.

3.5.2.3 Petroleum-Contaminated Soils

Petroleum contaminated soils, if they occur, will be removed and placed in the hazardous waste storage. Treatment of the spill area will involve mopping the spill and the contaminated soil stored in the hazardous storage area for collection and proper disposal.

3.5.2.4 Medical or First Aid Wastes

The onsite first aid station will handle minor accidents or emergencies, in the process generating wastes which would need to be disposed of effectively. Medical items which may be generated and need to be disposed of may include the following:

- i. Needles and syringes;
- ii. Used cotton wool;
- iii. Used gauze and plasters;
- iv. Empty bottles and vials; and

v. Test kits.

These wastes will be carefully bagged and labelled for collection and disposal by a licenced and qualified waste contractor.

3.5.3 Tropical Fruit Nursery and Plantation Development Wastes/ Biomass

The proposed project requires the movement of large amounts of shrubs/vegetation in the process of clearing the farm land for nursery and plantation development. The cleared vegetation would be made available to communities to be used for firewood and charcoal.

The biomass will then be used during the nursery development and transplanting periods as compost. In later phases of the project, the possibility of the generation of Bio-energy from generated biomass will be investigated.

3.5.4 Sewage

Black water (containing human waste) and grey water (from sinks, showers, etc.) will be directed to underground cesspits which will be emptied when full. The possibility for the implementation of a water/sewage treatment plan will be investigated in the later stages of the project.

4 PESTICIDE AND CHEMICAL MANAGEMENT PLAN (PCMP)

4.1.1 Introduction

During the nursery and plantation development operations several agrochemicals such as pesticides, herbicides and other chemicals will be utilised as a result of advanced agro business implementation.

The Pesticide and Chemical Management Plan (PCMP) outlines the general measures and approaches for prevention and mitigation of occurrences of pesticides and other agrochemicals in ground and surface waters following their application, and recommended actions to accomplish appropriate goals. Risks associated with the use of pesticides during the period of managing a pest outbreak are outlined.

The objectives of a PCMP are diverse based on the crop to be treated, location of crop, season for the application, the pesticide type and target pest. The key objective is to obtain maximum effectiveness while reducing the risk of contamination of surface water and ground water, or any other degradation to the environment.

4.1.2 Impacts of Agro-chemicals on the Environment

4.1.2.1 The Excessive Use of Pesticides and Herbicides

The overuse of pesticides is a contributor to soil pollution. Pesticides, which are sprayed on plants in a fine mist, have the ability to not only kill insects, weeds, fungi and small gnawing animals, but ultimately to poison the soil, negatively impact the growth of plants and ultimately hurt animals that are dependent on plants for food.

4.1.2.2 Groundwater Pollution

One of the chief sources of water pollution comes from agricultural chemicals such as fertilizers. Plants can only absorb a certain amount of nutrients. So if one over apply a chemical fertilizer, not all of the chemically synthesized nutrients within it will actually contribute to the plant's health and growth. Instead, the unused fertilizer will seep into the ground, where it can be carried by rain and irrigation ditches into streams, rivers, lakes, reservoirs and oceans. The chemical compounds in the fertilizer can contaminate drinking water supplies and disrupt ecosystems.

Runoff from excessive fertilizer application enters into waterways such as lakes and rivers and also percolates groundwater thus polluting water supplies. This not only poisons drinking water for people, but can have serious effects on wildlife living in those waters.

4.1.2.3 Nitrites and Nitrates

When excess nitrites and nitrates enter aquatic ecosystems, a deadly increase in the ammonia cycle occurs resulting in excessive ammonia in the water, which can kill aquatic plants and organisms.

Excess Nitrate levels are likely to result in eutrophication in nearby lakes /ponds thereby impacting aquatic biodiversity.

4.1.2.4 Phosphorus

Excessive phosphorus in aquatic ecosystems cause algal blooms, which in turn create a cycle whereby dissolved oxygen is depleted, resulting in plant and fish destruction. The pesticide nitrate is commonly found in groundwater.

Surface water and groundwater are often affected by chemical pesticides. Nitrate, a chemical pesticide used in cultivation is used worldwide and is the most prevalent contaminant of groundwater in the United States.

4.1.2.5 Pesticide Irritations

Pesticides can trigger irritations of the eyes, skin, nose and throat. Irritations include burning, itching, rashes, stinging and blistering. These chemicals can also cause diarrhoea, vomiting and nausea, headaches, wheezing and coughing.

Pesticides seep into groundwater and soil. Exposure to these pesticides can occur from drinking unfiltered water, eating contaminated fish, working next to contaminated soil while planting or harvesting crops, or from handling the contaminated soil.

4.1.2.5.1 Acute Toxicity

Sometimes immediate exposure to pesticides can set off respiratory problems, nervous system disorders and irritate pre-existing ailments such as asthma. Symptoms can range from mild irritations to death.

4.1.2.5.2 Pesticides and Other Disorders

Pesticide exposure is also linked to other chronic disorders and illnesses--such as endocrine disruptions, behavioural impairments, cancer, reproductive disorders and learning and developmental disabilities.

4.1.3 Integrated Pest Management (IPM)

IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programmes use current, comprehensive

information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. IPM takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides. The most important principle of IPM is to prevent pests from becoming a problem.

When there is an outbreak of any pests in a plantation, there is a need to determine the type of pest and also its stages and level of its population in order that the necessary management measures can be taken to bring down the infestation and achieve full control over the pests. Where complete reliance is placed on the use of pesticides, this may lead to the development of other more persistent problems such as development of resistant species of pests to treatments, pest resurgence, destruction of natural enemies of pests, and build-up of pesticide toxic residues in the environment and in the plant tissues as well.

The effectiveness of integrated pest management depends essentially on information related to the location and pest populations, made available through monitoring methods such as visual observations, trap monitoring systems, etc. Data related to pest populations, ambient conditions and location background facilitate the ability to diagnose a problem and choose the best intervention strategy.

The most effective approach to reducing pesticide pollution of waters is, first, to release fewer pesticides and/or less toxic pesticides into the environment and, second, to use practices that minimize the movement of pesticides to surface water and ground water. In addition, pesticides should be applied only when an economic benefit to the farmer will be achieved. Such an approach emphasizes using pesticides only when, and to the extent necessary to control the target pest. This usually results in some reduction in the amount of pesticides being applied to the land, plants, thereby enhancing the protection of water quality and possibly reducing production costs as well. The pesticide management measures identify a series of steps or thought processes that farmers should use in managing pesticides. IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions and control actions. In practicing IPM, a four-tier approach must be followed to determine the potential for pest infestation that requires a particular control action.

4.1.4 Alternatives to Fertilizer and other Chemicals Use

The following are some of the alternative that the project has taken into consideration for effective operation with little or no inimical impact on the environment:

- ✓ Organic fertilizer, such as compost, represents an alternative to chemical fertilizers. Project Agronomist would also consider digging out weeds instead of using herbicides. Keeping the plantation healthy with proper weeding and watering techniques will also reduce the need for herbicides.
- ✓ Before applying any fertilizers and other chemicals, the soil will be tested to determine what nutrients are needed to apply. In Pineapples, leaf samples are

analyzed on a regular basis to modify the fertilization if required. When applying fertilizers, read the label carefully and follow the application instructions precisely, including with respect to application quantity.

- ✓ Endeavour to avoid the use of any excesses/overuse of fertilizer, herbicides or pesticides and other agrochemical.
- ✓ Adequate technical training and best management practices must be implemented. Pollution risk can be reduced with better timing of fertiliser applications, improved techniques for using pesticides, reducing excess water release to drains and misuse of pesticides by applying in excesses.

4.1.4.1 Avoid Use of Pesticide

The first line of action in the IPM programme is to manage the crop to prevent pests from becoming a threat. These mean using cultural methods, such as rotating between different crops, selecting pest-resistant varieties, and planting pest-free rootstock. These control methods can be very effective and cost-efficient and present little risk to people or the environment.

4.1.4.2 Pest Monitoring

It must be noted that not all insects, weeds, and other living organisms require control. The programme includes work to monitor for pests and identify them accurately, so that appropriate management decisions can be made in conjunction with action thresholds. This monitoring and identification eliminates the possibility that pesticides will be used when they are not really needed or that the wrong kind of pesticide will be used.

4.1.4.3 Action Thresholds

Action threshold is a point at which pest populations or environmental conditions indicate that pest control action must be taken. The sighting of a single pest does not always mean control is needed. The level at which pests will either become an economic threat is critical to guide future pest management decisions.

4.1.4.4 Control

Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, the proper control method for effectiveness and risks associated with such management practice will be evaluated. If further monitoring, identifications and action thresholds indicate that less risky controls are not working, then additional pest control methods should be employed, such as targeted spraying of pesticides.

When pesticide applications are necessary and a choice of materials exists, farmers should be encouraged to choose the most environmentally friendly pesticide products. Users must apply pesticides in accordance with the instructions on the label of each pesticide product. Labels include a number of requirements including allowable use rates; whether the pesticide is classified as "restricted use" for application only by certified and trained applicators; safe handling, storage, and disposal requirements; etc.

4.1.4.5 Safe Storage of Pesticides

Pesticide storage areas can contain a wide range of concentrated chemicals, some in relatively large quantities. These chemicals must be stored and managed properly to prevent the potential release, through broken, damaged or leaking containers of chemicals that may have the potential to cause harm to human health and the environment. Some potential problems associated with pesticide storage areas include risk of spills during storage, mixing or loading operations; loss of security; accumulation of unwanted, old, or unregistered materials; and the risk of fire, flooding or some other disastrous events. These problems can be minimized through the proper use of building security, temperature control, fire prevention and, inventory control, secondary containment, emergency mitigation/planning, preventive maintenance, good housekeeping and user education. Follow the following safety recommendations:

- Do not stockpile pesticides. Reduce storage needs by buying only the amount of pesticide that you will need in the near future or during the current season when the pest is active.
- Pesticides should not be stored directly on the floor; they must be placed on raised pallets
- Follow all storage instructions on the pesticide label.
- Store pesticides high enough so that they are out of reach of children and pets. If possible, keep all pesticides in a locked cabinet in a well-ventilated utility area or garden shed.
- Never store pesticides in cabinets with or near food, animal feed or medical supplies.
- Store liquids on the bottom shelf, and do not store bagged material below liquids
- Always store pesticides in their original containers, which include the label listing ingredients, directions for use, and first aid steps in case of accidental poisoning.
- Do not store pesticides in places where flooding is possible or in places where they might spill or leak into wells, drains, ground water, or surface water.
- In a single storage system, separate insecticides, herbicides, fungicides, etc; label partitions clearly.
- Keep an inventory of stock to inform emergency response personnel in case of fire or other emergency. Make sure the inventory is accessible but away from pesticide

storage. Storing pesticides in one safe place helps to keep inventories organized and readily accessible to certified users.

- Make available absorbent material (such as dry sawdust, soil) in sufficient quantity to clean up any spills or leaks from containers
- If you can't identify the contents of the container, or if you can't tell how old the contents are, do not use such pesticide.
- Place a warning sign that states “Chemical Storage - Authorized Persons Only”
- Emergency contact phone numbers must be written on the door.

4.1.5 Responsibility for Implementation of Plan

The EHS Officer in conjunction with the Plantation Manager will be responsible for the implementation of the activities laid out in this plan. Employees involved in the use of pesticides will be trained in safe handling and use of these chemicals. PPE will be provided at all times and MSDS sheets made available.

5 EMERGENCY RESPONSE PLAN (ERP)

Emergency situations may arise from various activities and conditions during farming activities, which may include machinery failure, vehicle accidents, chemical and fertilizer spillage, wild fire etc. These could have potentially severe consequences for the Project if no emergency response plans have been put in place.

5.1 Introduction

The ERP is designed to enable management and employees to act quickly, decisively and cooperatively in any crisis or emergency situation. This ensures an appropriately measured level of response and recovery actions, depending on the nature, location and potential gravity of any given incident.

For the purpose of enabling consistent response and recovery actions and responsibilities in Sierra Tropicals Operations, all component plans of the framework recognize a consistent three level company Incident Classification System. The level at which an incident is declared, determines which response and recovery plans are implemented and which response and recovery teams are mobilized.




Each team performs a different but complementary function to the others. The Incident Management Teams are focused, dealing with controlling and containing the event and ensuring appropriate health and safety and environmental outcomes. The higher level teams are focused on operational support and consequence strategic management, dealing with the strategic issues arising from the incident, including HR management and stakeholder (media) communications.

Personnel will be competent and understand their roles and responsibilities during an emergency response situation. The plan will be periodically updated to incorporate lessons learned from previous incidents and exercises.

5.2 Emergency Response Plan

Sierra Tropical shall maintain and document operational and tactical procedures for site specific identified risks. The Emergency Response Procedures are to be managed by the site Project/plantation Manager or equivalent and are to become an Annexure in the site Incident Management Plan (IMP).

Typical emergency types, severity and responses that characterize the plantation expansion include:

Level I - Minor Incident	
Level II- Moderate Incident	
Level III- Major Incident	

Incident	Severity
Fuel/Oil/chemical/fertilizer Spillage	Green
Wild/bush fire	Red
Natural Disaster (Flooding)	Red
Road Accidents	Green
Machinery Accidents	Green
Medical Health Cases	Yellow
Minor accidents (Scrapes, Cuts, abrasions etc.)	Yellow
Medical Health Cases	Green
Civil unrest and disturbance	Green

An ERP will be developed and maintained suitable for a project of this nature to ensure a timely and appropriate response to emergencies.

5.2.1 Occupational/Environmental Incidents

5.2.1.1 Fuel/Oil/chemical/fertilizer Spillage

Step 1: Limit the quantity of the spill

- Trace the source of the spill
- Shut off the source

Step 2: Contain the spill

On Land: Pack sandbags/ sand filled hose or plastic/ sand or soil/ absorbent booms/ absorbents/ planking to either deflect the spillage to low places or onto plastic sheeting or to stop the spread of the spillage.

On Water: Use straw bales/ inflatable booms/ absorbent booms or sweeps to stop the spread of the spillage.

Step 3: Remediate the area by recovering the spillage and cleaning up

Implement the detailed cleanup methods outlined in Table 5.2-1.

Step 4: Determine extent of Spill

1. Determine the lateral extent along the surface or downstream by following methods
 - visual observation of water or soil surface
 - chemical analysis of water samples up and downstream
 - chemical analysis of soil in grid pattern from the spill
2. Determine the vertical extent by infiltration into the soil
 - visual observation of profile
 - chemical analysis of the profile
3. Determine if the groundwater or saturated soil has been polluted from the initial spill or by secondary mobilization of the pollutants by runoff by the monitoring of boreholes

Step 5: Rehabilitation of spill area

- If soil is contaminated dispose into the hazardous waste skip (small amounts) and if large area is polluted contact an Environmental Specialist
- Replace any topsoil which is removed
- Re-vegetate if required
- Undertake all additional actions directed to by authorities

Step 6: Incident Recording

Record the immediate actions taken on the Environmental Incident Report. Environmental Department is to report incident to EPA if serious.

Step 7: Replace Spill Response Equipment/Materials

- Replace any spillage clean up material and equipment used
- Undertake monthly inspections of spill kits and maintain checklists defining the minimum content

Table 5.2-1: Spill Cleanup methods

Spill Site	Clean-up Methods
Soil	<210L

Spill Site	Clean-up Methods
	<ul style="list-style-type: none"> • Contain spreading using absorbent booms and other absorbent materials
Cement Surface	<p><1000L</p> <ul style="list-style-type: none"> • If spreading contain spillage by means of absorbent booms • Use absorbents to remove spillage • NOTE NO WATER IS TO BE USED • Remove waste absorbent to dedicated grey container with wording “Oil and grease contaminated waste” • Clean stains with approved stain remover unless effluent will be captured by a separator
Water Surface	Use straw bales/ inflatable booms/ absorbent booms or sweeps to stop the spread of the spillage.
Leaking/Spillage from a bowser	<p><1000L</p> <ul style="list-style-type: none"> • If spreading contain spillage by means of absorbent booms • Use absorbents to remove spillage • NOTE NO WATER IS TO BE USED • Remove waste absorbent to dedicated grey container with wording “Oil and grease contaminated waste” • Clean stains with approved stain remover unless effluent will be captured by a separator

5.2.1.2 Accidents (Major and Minor)

Foreman or Person in charge (PIC) is normally the first person to be informed of an accident whether of a serious or minor nature.

The Foreman or PIC must record:-

- The time the accident is reported
- Who reported the accident
- How many persons involved
- Cause of the accident

- Type of injury - initial diagnoses
- First aid equipment required

The foreman or PIC must remain calm under all circumstances and re-assure the Person reporting the accident that he (Foreman or PIC) has all the information and will re-act accordingly.

- Phone the Chief Safety officer or subordinate and inform him of the accident and give details as given to him.
- Phone for an ambulance and request for more first aid equipment if necessary.
- Constantly record who he phoned, time, the instructions, received and information given.
- When the stretcher case arrives on surface, the injured person's name or number must be recorded as well as the name or names of person or persons who accompanied the injured.
- In the case of a serious or fatal accident the person who accompanies the stretcher must be instructed to accompany the injured/body to the hospital (continuity witness).
- The continuity witness must also be informed that he is a witness to the accident and if the person has died as a result of the injury, he will have to identify the deceased at the mortuary.
- It is important that a proper list of names of all responsible persons are posted in the report indicating their addresses and telephone numbers.

5.2.1.3 Medical Health Cases

Medical Health cases will be referred to the company's Doctor on retainership, or to the closest regional health facility. Communication procedures will be pre-established and made known to workers.

The family of any worker involved in a medical health emergency will be communicated to by the EHS Officer or the Community Relations Officer.

5.2.1.4 Civil Unrest and Disturbance

Civil unrest or social disturbances may be local, national or international. Procedures for responding to these situations need to be developed into specific actions plans which will be communicated to workers

Early Warning

Early warning may be received via various methods of intelligence.

- a. All intelligence received by any party must be forwarded to the Head of Security or his designate for verification.
- b. The HOD Security or his designate will issue an early warning order to the General Manager, Heads of Departments, Doctor/Paramedic and the Security Department Personnel. The aim of the early warning order is to inform management of the possibility of a situation developing and to place the security department on an alert status.
- c. Management will analyse the current status, with regard to personnel and assets, within their respective areas of responsibility.
- d. The HOD Security or his designate is responsible for an in-depth analysis and evaluation of the information gathered (risk analysis).
- e. The HOD Security or his designate will utilize the evaluated information to make a realistic prediction regarding developments. Should it be determined that a situation is developing, the basic emergency plan will be activated.

Activation of Emergency Response

Radio warning – the Head of Security or his designate will issue a general warning order via VHF radio.

Telephonic warning – the Head of Security or his designates will issue a warning order via cellular phone (alternative means VHF radio) to the relevant parties as follows:

- a. The General Manager or equivalent personnel who will warn all heads of departments and confirm that each has received the warning.
- b. The Doctor/Paramedic who will be on immediate standby with the ambulance.
- c. The Security Manager, who will ensure and confirm that his team is informed as well as other local and national security response groups/forces (police, military, etc).

5.3 Organization and Management Responsibilities

Certain members of the management team will have direct responsibilities for responding to on-site emergencies and will be part of the site emergency response team (ERT). The ERT will be coordinated by the EHS Officer.

5.3.1 Emergency Response Team

The EHS Officer is responsible for recruiting and training the Emergency Response Team. The ERT is comprised of site employees from all sections who are willing to submit to special training in order to assist in the case of an emergency.

Training of the ERT will enable members to respond to on-site emergencies. Refresher training will be conducted as necessary. Critical training areas include the following:

- i. Respond to emergencies involving fires;
- ii. First aid training;
- iii. Respond to emergencies involving injuries or fatalities;
- iv. Control and mitigation of spills or other accidental releases.

5.3.2 Emergency Management Teams (EMT)

Sierra Tropical Management will be responsible for managing high level emergency and crisis response and recovery for the Company, in accordance with the provisions of the Emergency Management Plan. Depending on the nature and potential gravity of the incident, the EMT may undertake this role alone (Level II Incident) or work with or hand over management of components of the incident to the CMT (Level III Incident).

5.3.3 Manager Responsibilities

Managers directly in charge of the plantations will be responsible for identifying potential safety issues and for coordinating the response to emergencies in their work areas. They will be responsible for notifying the appropriate personnel and authorities in the event of an emergency. Managers will also be responsible for documenting and reporting all incidents in areas under their direct supervision.

The EHS Officer in coordination with the Community Relations Officer will interact with the public when necessary to:

- i. Provide information to the public on project hazards and response programs;
- ii. Brief the public on emergencies; and
- iii. Arrange for evacuation and accommodation for affected people in the event of extreme emergencies.

5.4 Emergency Response Training

The EHS department coordinates emergency response training. The Emergency Response Team will participate in annual training at the site to ensure that all members are trained in equipment use and emergency response methods. Training includes chemical handling, fire fighting, pollution control, first aid, and personnel rescue techniques.

On site emergency personnel, who have roles in addition to their ordinary duties, will have a thorough understanding of emergency response procedures. Training will be directly related to their specific emergency response roles, and will include:

- i. Emergency chain-of-command;
- ii. Communication methods and signals;
- iii. How to call for help;
- iv. Emergency equipment and their use;
- v. Emergency evacuation while wearing protective equipment;
- vi. Removing injured personnel from enclosed spaces;
- vii. Offsite support and how to use it.

Emergency personnel will receive training in first aid and CPR and will practise hands-on rescue techniques on at least an annual basis. Training will also include recognizing and treating chemical and physical injuries and heat stress.

5.4.1 Employee and Contractor Training

The Emergency Response Team, under the responsible charge of the EHS Officer and Officer, will provide safety and emergency response training to all staff. The training will identify site-specific hazards and hazards associated with the project in general. The training will also review standard operating procedures, use of protective equipment, signalling an emergency (the alarm to be used, how to summon help, what information to give and who to give it to), evacuation routes and refuges, reporting protocol when an alarm sounds, and other general safety procedures. Emergency response training will also be provided to train staff on emergency response procedures, chains of command, and responsibilities of key individuals.

Safety, emergency response, and first aid training will be provided at the time of hire. All staff will also be required to attend annual refresher courses. Contractors that perform any work on site will be required to show evidence of appropriate health, safety and emergency response training. The project management will develop an orientation program to advise contractors and site visitors on basic health, safety and emergency procedures such as emergency signals and evacuation routes.

5.4.2 Emergency Drills

Periodic testing of emergency procedures will be performed to ensure that the company and external emergency services can appropriately respond to emergency situations.

Testing of emergency procedures will involve external emergency services providers, where appropriate, to develop an effective working relationship. This can improve communication and cooperation during an emergency.

Emergency drills can be used to evaluate the company's emergency procedures, equipment and training, as well as increase overall awareness of emergency response protocols. Internal parties (e.g. workers) and external parties (e.g. fire department personnel) will be included in the drills to increase awareness and understanding of emergency response procedures.

Records of emergency drills will be maintained. The type of information that will be recorded includes a description of the situation and scope of the drill, a timeline of events and actions and observations of any significant achievements or problems. This information will be reviewed with the drill planners and participants to share feedback and recommendations for improvement.

5.5 Communications

Effective communication systems are critical to successful emergency response.

5.5.1 Internal Communications

The internal communication system is used to convey safety information to workers in danger, and maintain site control. Mobile phones will be used for communication between supervisors on the plantations and management in the office facility.

Training on the internal communication system will be provided to all employees as part of their employee orientation program.

5.5.2 Communications during an Emergency

During an emergency, the emergency response centre will be contacted immediately. The main security stations will be equipped to handle all radio and telecommunications calls in the case of an emergency.

In the case of an emergency a prompt notification of appropriate individuals will be done immediately. In the event that there is a need for the timely and rapid notification of local communities, the first responder will immediately contact the EHS Officer who will immediately contact Community Relations Officer and the key management team. This will trigger the appropriate emergency notification system that will be developed.

5.5.3 Communications with the Public

The EHS Officer, in collaboration with the Community Relations Officer, will be responsible for all local communications with the public. As required, meetings will be

held to disseminate information related to emergencies. A Community Liaison forum could be established as part of the PCDP process and this forum used for communication regarding emergencies. The EHS Officer will coordinate with the Site Manager on the incident and advise on what information should be released to the public, government officials and other interested parties.

In providing information to the public, the EHS Officer and CRO will provide information on the following:

- i. Description of the event;
- ii. Identification of the population that might be affected;
- iii. Description of any injuries and disposition of those involved in the accident; Identification of any existing hazards;
- iv. Description of precautions taken to limit future risks;
- v. Identification of water source contaminated (if any);
- vi. Description of mitigation measures that are proposed or have been taken to correct the problem; and
- vii. Contact information.

Waiting and briefing areas for family/relatives of those involved in serious accidents will also be established. Food and a sitting/sleeping area will also be provided to members of the family and relatives as appropriate.

5.6 Grievances, Disputes and Security

The Project's Public Consultation and Disclosure Plan include procedures for dissemination of information to the public, stakeholders, and non-government organizations. The plan also includes a mechanism for grievances, so that public concerns related to the project can be addressed through a formal grievance process.

Despite this proactive approach, disputes could occur, for a number of reasons outside of the project management's control, and actions by workers or non-workers could develop and may result in violent or non-violent protests, attacks on project personnel, property damage, or even hostage taking. The Security Manager will oversee an on-site security team that will be used to maintain the security of the site. This team will also work closely with local government authorities (police, military) to maintain the security of the project area. In addition, a response program to address these issues, in cooperation with the Sierra Leonean government, will be developed for the site.

In the event of a confrontation with employees and/or non-employees, the EHS department will be immediately contacted. The security team will, under the direction of the EHS

Officer, implement response protocols based on pre-determined plans. These plans and protocols are not outlined here in order to maintain confidentiality and assure that such response protocols can be undertaken without counter-plans having been developed that would undermine the effectiveness of the response.

6 RESETTLEMENT POLICY FRAMEWORK (RPF)

6.1 Introduction

It is not envisaged that the project will entail any displacement of people and extensive damage to crops. However, it is possible that the infrastructure requirements of the project in terms of feeder road construction/rehabilitation and other project logistical requirements may result in damage to crops. Whilst it is impossible at this stage to determine and assess these, procedures should nevertheless be put in place to handle such matters if they arise.

The framework for compensation and entitlements based on the national policy is usually developed. Compensation rates for several classes of assets, including land and crops, are established by legislation as part of national policy. Compensation rates should be agreed with the participation of the government and other stakeholders. Projects usually seek to ensure that compensation is adequate and will provide alternative entitlements and payments where government agreed rates do not meet this requirement.

6.2 Grievance and Redress Mechanisms

Providing credible and accessible means for affected persons to pursue grievances allows Sierra Tropical to address genuine issues in a timely manner and decreases the chances of resistance to their activities from disgruntled persons.

At the time the individual compensation contracts are signed, affected individuals and households would have been informed of the process for expressing dissatisfaction and seeking redress. The grievance procedure will be simple and will be administered as far as possible, at local levels to facilitate access by project affected persons.

Work related grievances should be dealt with at work through appropriate channels in the workplace (Management/Union) following company grievance/disciplinary procedures. Non work related issues related to damage of property, non-fulfilment of contracts, levels of compensation, or seizure of assets without compensation shall be addressed to a Grievance redress committee specially set up for this purpose, the composition of which will be agreed upon by the company and community representatives. All attempts shall be made to settle grievances amicably. Those seeking redress and wishing to state grievances will do so by notifying this committee, which will inform and consult with the local and regional administration to determine validity of claims. If a claim is valid, the committee will notify the complainant accordingly. If the complainant's claim is rejected, the matter shall be brought before the local and/or regional authority for settlement. The complainant may seek redress in the established national legal system.

It has to be noted that in the local communities, people take time to decide to complain when aggrieved. Therefore, the grievance procedures will ensure that the project affected persons are adequately informed of the procedure, before their assets are taken. The grievance redress mechanisms is designed with the objective of solving disputes at the earliest possible time,

which will be in the interest of all parties concerned and therefore, it implicitly discourages referring such matters to a court for resolution.

All objections to land acquisition shall be made in writing, in simple language that the project affected persons understand and are familiar with, to the Committee. Copies of the complaint shall be submitted to the concerned Officer within 60 days after the issue of the Notification of Expropriation Order. Channelling complaints through the Committee is aimed at addressing the problem of distance and cost the project affected persons may have to face. The Committee shall maintain records of grievances and complaints, including minutes of discussions, recommendations and resolutions made.

The procedure for handling grievances will be as follows:

- i. The affected person must file his/her grievance in writing to the Committee with a copy submitted to the concerned company representative. The grievance note should be signed and dated by the aggrieved person, where the affected person is unable to write, he/she should obtain assistance to write the note and endorse the letter with his/her thumbprint;
- ii. The Committee must respond within 14 days during which any meetings and discussions to be held with the aggrieved persons must be conducted. If the grievance relates to valuation of assets, experts may need to be requested to revalue the assets, and this may necessitate a longer period of time. In this case, the aggrieved person will be notified by the Committee that his/her complaint is being considered;
- iii. If the aggrieved person does not receive a response or is not satisfied with the outcome within the agreed time, he/she must lodge his grievance to the paramount chief and the concerned company representative;
- iv. The paramount chief and concerned company representative will then attempt to resolve the problem (through dialogue and negotiation) within 14 days of the complaint being lodged. If no agreement is reached at this stage, then the complaint is taken to court.

7 COMMUNITY DEVELOPMENT ACTION PLAN (CDAP)

7.1 Introduction

7.1.1 Purpose and Objectives

A Community Development Action Plan (CDAP) has been developed to manage the activities associated with the proposed agricultural project, to be undertaken by Sierra Tropical Ltd. (STL), which may lead to the occurrence of the issues and impacts discussed in this document. The plan consists of a management strategy, broken up into recommendations that will attempt to maximise benefits and minimise any adverse impacts on the local communities.

The company (STL) plans to implement the following management measures to ensure that the issues and concerns expressed during sensitization meetings about the project are properly mitigated and avoided as much as possible:

- i. The project will be planned and carried out strictly in accordance with the provisions of the Environmental Protection Agency Act 2008;
- ii. The project proponent will endeavor that the positive benefits from the project area are focused on the host and concerned communities;
- iii. This CDAP will focus on establishing sustainable livelihood projects and capacity building within the concerned host communities.

These management measures identified, will attempt to mitigate any negative impacts that may result from the project and enhance the positive consequences that will occur.

The key objectives of the CDAP are:

- i. To provide opportunities for long-term community and economic development for the concerned and host communities;
- ii. To identify appropriate mitigation measures to address socio-economic issues and impacts identified in the ESIA;
- iv. To identify appropriate mitigation measures to address induced population growth resulting from a possible influx of new comers into the area, attracted by the project development;
- iii. To seek ways of building mutually beneficial linkages between the concerned people and other development programs

7.1.2 Sources of Data and Information

The main sources of data and information for the Community Development Action Plan are:

- i. Findings from the socio-economic analysis of the conducted baseline study;
- ii. Focus Group Discussions with key stakeholders of affected communities and

- iii. Information from documents supplied by Sierra Tropical Ltd and other secondary sources.

7.2 Project Area

The socio-economic baseline survey for the Sierra Tropical Agricultural project covered Twenty-two (22) towns and villages in the Lugbu Chiefdom, Bo District. These towns/villages include:

Sumbuya Town	Gelehun Village
Moforay Village	Bamba Village
Garinga village	Momandu Village
TawamahehunVillage	Mosomgbo Village
Komende Village	Gola Village
Makombo Village	Baoma Village
Upper Saama Town	Heima Village
Yambama Town	Tungie Village
Bendumasewa Village	Gbaloahun Village
Gelehun Village	Kpumbu Village
Kpatema Village	Lower Saama Village

7.3 Possible Areas for Community Development

7.3.1 Agriculture

7.3.1.1 Access to Improved Seed Varieties

The use of improved seed varieties (non GMO hybrids) enhances the output of agricultural produce if available. Farmers engaged in crop production (food or cash crops) in these areas still use local or unimproved seeds and cultivars for production. Yields are therefore low and less income is generated thus leading to a low standard of living.

From the household survey and the Focus Group Discussion meetings, it was revealed that all the surveyed households lacked improved seed varieties. The reasons for the non-usage of improved seed varieties in the project areas are a lack of knowledge about improved seed varieties, unavailability in the local market and/or the lack of financial resources to purchase.

Farmers with knowledge in improved seed varieties know that the use of reused, non-selected grain seed is not profitable for production purposes.

7.3.1.2 Promotion of the Use of Manure

Sensitization and appropriate training programs can be organised on the use of manure. The most practical in and around Sumbuya would be green manure and compost. In green manuring, the wild grasses and plants and purposely planted legumes, some already growing in the area, are incorporated back into the soil at flowering or before seeding using a hoe. Compost can also be made from left over plant residues, particularly rice stubble and husks and mixed with green crop residues to create improved diversity, in turn improving the compost quality.

7.3.1.3 Promotion of Production and Use of Compost

The preparation and use of compost can be necessary in helping replenish lost nutrients. Compost is mainly for improving the soil environment to encourage improved microbial action which improves the breakdown of natural mineral elements to improve soil fertility and ultimately crop productivity. This is more effective, with better results, for the small farmer or home owner vegetable crop production. There are future plans to introduce organic fruit production on the new plantation which will be ideally suited to small holder participation.

7.3.1.4 Introduction and Promotion of Labour-Saving Tools and Equipment

Farming in rural areas is labour intensive and time consuming. Most farmers are still using crude tools and investing lots of energy into their farming activities without getting the commensurate return. New technology and methods to improve productivity will be taught at the various stages to address this.

Labour saving tools and equipment, where possible, suited to the particular crops grown in the Sumbuya area will be identified with the assistance of Government (Agricultural Extension Officers or other Non-governmental Organizations). An example would be a milling /chipping machine and press for the production of Garrie. Other examples could include tractors, soil preparation equipment, planters etc. The use of these machines will lead to larger scale farming with more income for farmers for their efforts.

7.3.1.5 Improved Prevention and Treatment of Plant Diseases and Pests

Unnecessary crop losses are experienced by farmers in the project area because of their poor knowledge and inability to prevent and/or control pests and diseases. The lack of knowledge to practice good cultural methods and other ways of preventing and controlling pests and

diseases, contributes to low crop productivity. Pests and disease are generally prevented or controlled through the following methods:

- i. Improved cultural control methods;
- ii. Biological control method by encouraging the establishment of natural enemies of pests and diseases;
- iii. Chemical control methods; as a last resort the use of fungicides and insecticides etc.

7.3.1.6 Promotion of Cultural Practices

Cultural practices are the most effective and cheapest ways of controlling pests and diseases of crops. Some of these practices will include:

- i. Regular weeding of crops to prevent disease pathogens or pests from being harboured by weeds;
- ii. Practicing crop rotation;
- iii. Inter-cropping cropping;
- iv. Removal and burning of infected plants;
- v. Using healthy and resistant seeds or cultivars for propagation;
- vi. Incorporation of crop residues after harvesting into the soil to prevent the build-up of disease pathogens and pests;
- vii. Timely planting can help plants to escape period of disease occurrence;
- viii. Timely harvesting can help reduce period of exposure; and
- ix. Planting of resistant varieties

7.3.1.7 Improved Access to Agro-chemicals

Even when the necessary chemicals are recommended to farmers, many of them cannot afford to buy or gain easy access to them. Through Sierra Tropical Ltd, with Government and private organisations, the company could help the effort of farmers by making available to them the useful chemicals together with adequate information and proper training to ensure their safe and effective use when required.

7.3.1.8 Safe use of Agro-chemicals

The knapsack sprayer is usually used to spray chemicals (pesticides), on to crops. It is very important that farmers are trained to use these chemicals safely. Some of the safety measures include the following:

- i. The use of the prescribed personal protective equipment for the chemical;

- ii. The correct mixing of the chemical with water;
- iii. Avoid spraying during wet weather or before rain is forecast;
- iv. Avoid spraying against the wind direction;
- v. Keep chemicals in a dry, leakage free store out of the reach of children;
- vi. Avoid eating when spraying;
- vii. Ensure that the whole body is properly washed with water and soap after spraying;
and
- viii. Spraying should be done in the early morning or late in the evening.

7.3.1.9 Improved Network of Feeder Roads

This is an important element in any agricultural operation, to facilitate easy access to the fields for tractors and equipment. It is just as important as providing easy and safe access for the community living in and around the plantation. Support for the rehabilitation, upgrading and regular maintenance of feeder roads are of major agricultural importance. This component can be implemented where necessary in collaboration with SLRA, NaCSA, local councils and private contractors.

This will contribute to the reduction in the cost of transportation (better road maintenance by STL) and increase the volume of goods transported from the production areas around the various villages to market centres by making access easier and quicker.

7.3.1.10 Improved Access to Agricultural Extension Service

There is a gross lack of good agricultural extension services related to crop production in the Sumbuya project area. Farmers should have improved access to agricultural extension services. The company can facilitate improved access to Government extension services and NGO's.

Government and NGOs could also embark on training extension officers, from the area that will be well equipped with information and motivated to visit local farmers. The company will in due course provide extension officers specialized in tropical fruit production to train growers and additional extension officers in the communities to provide additional support.

Bringing in other parties, with specialized knowledge in rice production, for example, is also planned. They too will provide the necessary extension specialists.

7.3.1.11 Establishment of Functional Linkages between Farming Communities and Service Providers

Trained extension workers can effectively serve in this capacity since their work is all about disseminating useful information to farmers and also communicating farmers' problem to the

authorities concern. Continual training and updating are a part of the company's culture to keep up with best practices and international standards.

7.3.1.12 Survey Participants' General Perspectives for Development of Agricultural Potential in their communities

In order to improve the potential for agricultural development for farmers, in the project areas, the participants of thematic focus group meeting formulated the following recommendations to be implemented:

- i. Provision of improved seed varieties;
- ii. Provision of other farm inputs, including fertilizer and agro-chemicals;
- iii. Provision of mechanized farm equipment;
- iv. Effective measures to prevent and treat plants diseases and pests;

Sierra Tropical will, during its development in Sumbuya address these recommendations as the new plantation becomes operational, in particular, as an integral part of the proposed out growers scheme.

7.3.1.13 Sierra Tropical Ltd Proposed Out growers' Programme

The Out Growers scheme will be important for Sierra Tropical Ltd. in achieving its longer term goals. The company aims to source a proportion of its various tropical fruit requirements from local growers in and around the new plantation.

It will also give opportunity to communities surrounding the Company's sites to develop farmer entrepreneurship among the residents and allow them to grow an agricultural business and earn improved income from their efforts.

Benefits

The benefits of the program to the outgrowers includes access to a contracted market for their production, anticipated future access to low cost financing provided by local banks, access to tested and proven farm technology, benefit from a lower cost, a more reliable supply of inputs, and receive specialized training specific to tropical fruit cultivation. They will be part of a disciplined agricultural production system and organizational structures.

The proposed Growers Program aims for the establishment of a tripartite relationship among the growers and/or Farmers Association, a financing institution and Sierra Tropical Ltd.

Roles and responsibilities of the parties will be as follows:

Outgrowers and/or Farmers Associations

- Labour to work on the land
- Compliance to prescribed agricultural practices

- Motivation to succeed
- Member education and fund/time management
- Provide services if necessary (trucking and farm implements)

Benefits from Sierra Tropical Ltd

- Assured market on a contractual basis
- Provide planting materials
- Provide training and technology
- Long-term commitment
- Management and organizational expertise
- Assistance in strengthening farmer associations and accessing financing
- Impart entrepreneurial spirit to growers
- Potentially serves as a collecting agent of the financing institution
- Environmental awareness protection and safe-agricultural practices

7.3.2 Health

7.3.2.1 The Upgrading and Improvement of Community Health Centres

During the survey, land owners were asked about the primary means of seeking treatment for members of their household. The majority (70%) of them indicated that Community Health Centre is the most common source of treatment for households in the study area; the rest obtained treatment from the Government Hospital drug peddlers. The fact that not many respondents indicated the use of a “drug pedlar” (1%) and none reported the use of traditional healers/treatment, is an indication that the community hospitals are doing quite well (effective and affordable) in providing health care to household members in the study population. The Community Health Centres are few and far between resulting in people travelling up to 10 or more miles for medical treatment. The nearest “very basic” Government Hospital is at Sumbuya which is approximately 18 Km from the farthest settlement.

There is therefore a dire need for the provision of Health Care Centres for the projects affected communities. To this extent STL will facilitate and collaborate with MoHS, NGOs and other development partners to help establish Primary Health Care Centres complete with the necessary , equipment, medication and staff at strategic locations that will be accessible by all members of the project affected communities. Additional assistance planned in the area of medical services and health care and with the relevant organizations includes:

- i. Programs to combat infant malnutrition;

- ii. Immunization and programs targeted at prevention of childhood diseases;
- iii. Sanitation and health education; and
- iv. Education and testing programs for sexually transmitted diseases and HIV/AIDS.
- v. Training First Aiders among STL's staff and providing emergency first aid boxes in strategic locations.

7.3.2.2 Training of Village Health Extension Workers

It was observed during the EIA that most of the people in the project affected communities lack the basic knowledge of best practices in the upkeep of their environment and personal hygiene. To address this problem, STL shall collaborate with the MoHS, NGOs and other appropriate development partners to provide training for Health Extension Workers who will sensitise the residents of villages in the projects affected communities on best practices in environmental upkeep and personal hygiene.

7.3.2.3 Promotion of Family Planning

According to information gathered from residents of the project area, there is very limited family planning in the area especially in the small villages resulting in many undesirable consequences such as unwanted pregnancies, early teenage pregnancies, and poor spacing of children within a family. The main reasons for not practicing family planning include the health clinic being too far away, religious beliefs and/or lack of awareness.

Additional efforts to encourage parents to immunize their children for Polio, Measles, Tetanus and Yellow Fever will be considered.

In order to sensitise the project affected persons on the need for family planning, STL intends collaborate with the MoHS and the NGO Plan Parenthood Association Sierra Leone (PPASL) to conduct awareness raising sessions on family planning in the project affected areas.

7.3.2.4 Enhancement of HIV/AIDS Awareness

The findings of the survey showed that most household heads have heard about HIV/AIDs, suggesting that whatever awareness raising and sensitisation campaign and programmes have been going on in these communities have had a positive impact.

A two-fold approach will be developed to address HIV and AIDS, encompassing both education and prevention. Support of treatment programmes will be considered at a future date following an assessment of the scale of infection and the need for treatment. The objective of the education programmes will be to increase awareness of how HIV is transmitted how to prevent transmission and advice for patients and their relatives and families. Information, education and communication materials will be developed through coordination with NGOs as well as the Ministry of Health and NACU.

Prevention programs are anticipated to be developed in parallel with, and to support the education and awareness campaigns. Programs to be considered and evaluated will include further health education, provision of condoms to community health centres, treatment programmes for sexually transmitted diseases, as well as voluntary and confidential HIV testing.

7.3.3 Education

7.3.3.1 Improved Village Primary School Facilities for Boys and Girls

From the household survey, most households covered in the Study Area have children of school-going age (6 to 13 years old). These households confirmed that all their children of school-going age do attend school.

In order to improve primary schooling in the project area affected communities and to further enhance the educational status of the majority of all the children in these communities, the following initiatives have been recommended to the company for implementation, with other development partners:

- i. Furnish and equip the existing primary schools in the project area to meet the Basic Operational Level (BOL)-safe school infrastructure, clean drinking water and good sanitation;
- ii.
- iii. Establishment of a functioning School Management Committee (SMC) in each school;
- iv. Provision of free teaching and learning materials and aids and school library in each school; and

STL will collaborate with the MEST, international and national NGOs such as UNICEF, Plan International, Forum for African Women Educationists (FAWE), Action Aid and World Vision and World Hope for the implementation of this programme.

7.3.4 Water and Sanitation

According to results of the household survey, the main drinking water source in the study population is the Sewa River, used by more than one-third of households. This is followed by open water wells (accounted for by more than one-fourth of the respondents), hand pump well (one-fifth), while pond and spring accounted for less than 5 percent of households. The Majority of the above sources are unsafe and accessed at a distance resulting in people walking distances to well over one kilometre.

7.3.4.1 Installation of Wells with Pumps

In order to improve access to safe drinking water, STL shall collaborate with government institutions and/or private organisations within the project area to install water wells with pumps at strategic locations within easy reach of most households in the chiefdom. All efforts will be made to inspect the wells regularly and give established treatment to water in the wells if and when necessary. As part of STL's environmental responsibilities water testing will be carried. Results will be included in the EMR (Environmental Monitoring Report).

7.3.4.2 Improved Hygiene and Waste Management

The Majority of the respondents dispose of their refuse by dumping into the bush, while 4.5% of the respondents dispose of their refuse by making compost. The rest of the respondents' dispose of their refuse by dumping into rivers or streams. This indiscriminate disposal of solid waste is unsatisfactory as it leads to general pollution and degradation of the environment. To help address the issue, STL will support this by:

- Sensitization on Hygiene Promotion (WASH Programme Promotion)
- Creation of a village dumping site
- Water testing to ensure non contamination of ground water

STL will collaborate with other development partners to train Village Health Extension workers who will go out and train residents of the project affected communities in the basic elements of Hygiene in their environment generally and also that of personal hygiene. The development partners who may assist STL to carry out this project may include all or any of the following: MoHS, the School of Hygiene in Bo City, World Vision, UNICEF and National School of Nursing in Freetown

7.3.5 Sustainable Use of Energy Sources

7.3.5.1 Introduction and Promotion of Development of Community Tree Plantations

Almost all the household respondents use wood fuel to provide energy for domestic requirements, while very few use charcoal or a combination of charcoal and wood fuel. Over the years, there has been a systematic felling of trees to provide this energy source resulting in people having to travel longer distances every year in search of firewood to be used directly for cooking or for producing charcoal for domestic use.

In addition, with the clearing of areas of secondary regrowth several shrubs/trees that provide food or medicinal values e.g. *Parkia biglobosa*, or 'boboï' (Mende name) *Irvingia gabonensis* will be reduced so needs to be replaced and introduced into proposed buffer zones.

In order to address this situation, STL will collaborate with development partners to establish a nursery for producing a variety of trees, like acacia species, which will provide fuel wood and charcoal to provide the energy as well as trees with nutritional and medicinal properties to meet the needs of the residents in the project affected communities. The project proponent

shall collaborate with MAFFS, the Department of Agricultural Extension of the Njala University, other NGOs and the MIRO Forestry Company to introduce and develop community tree plantations.

7.3.6 Other Local Initiatives Promotion

7.3.6.1 Introduction and Promotion of Fuel-Saving Stoves

Nearly all the households in the project area depend on fuel wood to provide their energy needs. Cooking in these households is done using very simple open fires which is very inefficient leading to high consumption of fuel wood which is against the national energy policy of Sierra Leone that is geared towards improving energy efficiency and conservation in all sub-sectors.

In the future, in order to address this problem of inefficient utilization of fuel wood, STL shall collaborate with other development partners to introduce and promote Fuel-Saving Stoves in the project affected communities. Possible partners in this venture will include the Agricultural Extension Department of Njala University and other NGOs.

7.3.6.2 Enhancement of Skills and Performance of Craftsmen and Artisans

During the focus group discussion meetings, skills training in various trades, like plumbing, carpentry, masonry and craftsmanship were identified as an alternate source of income for residents in project area.

In order to enhance the skills and performance of craftsmen and artisans in the project areas:

- i. Sensitisation could be provided for craftsmen and artisans on ways to access credit or loan facilities so as to improve their activities;
- ii. The project proponent in collaboration with existing NGOs could provide improved vocational skill trainings for interested residents of study area;
- iii. The project proponent could help provide vocational skills training workshops.

7.4 Implementation Plan

The overall implementation of the CDAP will be funded by STL and implemented in collaboration with concerned government agencies, NGOs and the private sector.

7.4.1 Community Development Committee

The establishment of a Community Development Management Committee to steer the development process will be an important step once STL establishes itself in Sumbuya.

Proposed Membership

- The Paramount Chief or the Chiefdom Speaker;
- Leaders of the youth groups;
- Women's leader;
- Representative of the tribal groups;
- The town chiefs
- The councillors of the entire project area;
- The Senior District Officer;
- STL Community Relations Officer;
- Member of Parliament for the Constituency.

The Project Steering Committee will select a Project Manager, who will chair the Committee.

7.4.1.1 Responsibilities

The Committee will be responsible for finalising guidelines included in this CDAP document and co-ordinating the implementation of the CDAP. Meetings will be held monthly in order to discuss relevant community development related matters and monitor the progress of the CDAP relative to targets.

7.4.2 Appointment of Implementation Agents

7.4.2.1 Health

For the implementation of the health projects, a local agency, such as World Vision an NGO working in the area could be engaged for their implementation. Other potential institutions could include the Ministry of Health and Sanitation and the Ministry of Education and other NGO's.

7.4.2.2 Agriculture

For projects in agricultural assistance, technical support will be obtained from the Ministry of Agriculture, Forestry and Food Security (MAFFS), Sierra Leone Agricultural Research Institute (SLARI), Rice Research Station (RRS), relevant Departments in the Faculty of Agriculture of the Njala University (NU) and NGOs working in agriculture and related activities.

7.4.2.3 Education

Collaboration and expertise for assistance from the Ministry of Education and international or national NGOs such as UNICEF, Plan International, Forum for African Women

Educationists (FAWE), Action Aid and World Vision to provide guidance for the implementation of this programme.

For vocational skills and adult literacy, a concerted collaborative effort with the non-formal sector of Ministry of Education, UNICEF, UNESCO, Plan International and other education-based NGOs and Community Based Organisations (CBOs) will also be approached for guidance and expertise.

7.4.3 Budget

The total budget for the implementation of the recommended activities in this CDAP is estimated at US\$ Three hundred thousand. This budget covers the indicated developmental projects (**Error! Reference source not found.**).

Table 1: Developmental Projects

Table 7.4-1: CDAP Budget for Developmental Projects over 5 years

Projects	Budget US\$					
	<i>Yr 1 - 2017</i>	<i>Yr 2 - 2018</i>	<i>Yr 3 - 2019</i>	<i>Yr 4 - 2020</i>	<i>Yr 5 - 2021</i>	<i>5year Total</i>
Community Agricultural Support Programme – Materials and Funding	5,000	10,000	20,000	20,000	20,000	75,000
Support to Health	10,000	15,000	20,000	20,000	20,000	85,000
Support to Education	5,000	5,000	25,000	25,000	25,000	85,000
Support to Water and Sanitation	15,000	10,000	10,000	10,000	10,000	55,000
Total	35,000	40,000	75,000	75,000	75,000	300,000

7.5 Monitoring And Evaluation

STL will make arrangements to undertake on-going monitoring, evaluation and review of the CDAP. Monitoring will ideally be regularly undertaken as necessary to guide the company in ensuring effective implementation and beneficiation to the communities. The monitoring programme, will aim to address both the short and long term impacts of the proposed Agricultural Project on the affected communities in and around Sumbuya.

Monitoring activities will include:

- i. Ensuring the satisfactory implementation of the CDAP;
- ii. Responsibility for the environmental management and infrastructure maintenance is transferred to local leadership and that unsuitable dependencies are not created; and
- iii. Ensuring that environmental degradation is limited so that the economic and resource base on which the villagers depend is not destroyed.

As part of STLs ongoing commitment to improving the situation in the villages in the project area the CDAP will be regularly reviewed and adjusted based on:

- The Conclusions of audits/findings
- Annual Financial Budget reviews
- The recommendations determined by the Development committee for future development plans

7.6 CDAP Summary of Possible areas of Development

Area	Development Target	Development Action	Section Referenced
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Area	Development Target	Development Action	Section Referenced
Agriculture	Training & Advocacy Improved roads and pathways Improved Extension Services	<ul style="list-style-type: none"> • New seed varieties • Fertilizer • Access to Pesticides • Safe use of Chemicals • Cultural practices • Compost • Green Manuring • Improved Productivity • Labour saving machines • On Going based on area and needs etc. (Identified in census) • Linkages to experts in rice production etc. 	3.1 Agriculture
Health	Heath Centers	<ul style="list-style-type: none"> • Water supply • Electricity repair • Transport – (ambulance) • Staff training • First Aid Kit and Team 	5. Health
	Family Planning & Immunization	<ul style="list-style-type: none"> • HIV • Aids • (Malaria) • Vaccinations 	Promotion of Family Planning & Immunization
Education	Improved Primary School facilities	<ul style="list-style-type: none"> • Furniture • Equipment • Trained Teachers • Recreational/Sports 	6.Education
Water & Sanitation	Improved water quality and supply	<ul style="list-style-type: none"> • Installation of wells • Water supply • Pumps where req'd 	7. Water & Sanitation

Area	Development Target	Development Action	Section Referenced
	Hygiene Promotion Waste Management	<ul style="list-style-type: none"> Water testing WASH <ul style="list-style-type: none"> Create a village waste site Mapping Water Sources. 	
Sustainable use of energy sources	Community tree plantations	<ul style="list-style-type: none"> Trees for fuel Trees for Food Buffer Zones Reforestation Mapping Water Sources. 	8.Sustainable use of energy sources
Local Initiative Promotions	Fuel Saving Enhancement of Skills	Fuel Saving Stoves Artisans, Brick layers, Carpenters, Tailor	9. Local Initiative Promotions.
Implementation	Community Development Committee	Providing guidelines for development requirements and initiatives, monitoring implementation.	10. Implementation

8 PUBLIC CONSULTATION AND DISCLOSURE PLAN (PCDP)

A PCDP is designed to provide local residents, non-government organizations (NGOs), government and other interested parties with project information and to allow those stakeholders to participate in the planning process. Stakeholder participation encourages sustainable growth by accounting for community needs as they relate to the proposed project. Development of sustainable programs will help to maintain long-term project viability. A PCDP incorporates public meetings for stakeholders to air project concerns and to ensure that during different phases of the project benefit stakeholders by allowing them to voice their opinions, make suggestions, that meaningfully influence the process of project development, and keep them (stakeholders) informed of current updates on project information.

8.1 Objectives of PCDP

The objectives of a PCDP are:

- To disseminate relevant project information to stakeholders/affected communities and to document any concerns/issues from such stakeholders;
- To improve communication between project management and affected communities;
- To document public consultation events; and
- To disclose selected project documents to affected communities/stakeholders.

The main objective of the PCDP is to establish a program for multi-directional communication between Sierra Tropical Ltd and stakeholders. To meet this objective, this plan provides the following:

- Identification of key stakeholders;
- Description of the resources and the responsibilities of PCDP implementation, including receipt and response to grievances;
- Descriptions of how data will be collected and maintained, in order to adequately monitor and report the effectiveness of the PCDP.

8.2 Resources and Responsibilities

The Community Relations Officer reports directly to the Project Manager and will be responsible for the public consultation and disclosure program. He/She will also be responsible for coordinating with the EHS Officer on all community relations, public consultation programs and dispute resolutions.

Other responsibilities and duties of the CRO may include the following:

- Identifying when meetings are necessary and scheduling them;
- Circulating or publicizing agendas and local advertising;
- Inviting specific individuals to meetings;
- Attending and documenting meetings;
- Directing any required follow up; and
- Working with NGOs, the Community Development Management Committee to develop, plan and implement sustainable development projects as shown in the CDAP.

Follow-up work on the above may include additional meetings, arranging for specialized consultants, or bringing specific issues to the Project Manager and ensuring that appropriate actions are taken.

8.2.1 Stakeholders

Public consultation and disclosure initiatives need to target key project stakeholders to keep them informed of project plans and of any substantial changes that may be made to its design or operations.

8.2.2 Consultation and Disclosure Program

The consultation and disclosure program is aimed at informing the stakeholders of project plans and activities in a manner that promotes open dialogue among all interested parties, but particularly those that are or will be affected by the Project. The program allows directly affected parties to have meaningful input in the decision-making process regarding the development of the Project and the mitigation of impacts that will affect them. Meetings will be scheduled and informational materials disseminated as needed to keep people informed and to maintain project transparency in the public eye. It is the responsibility of the EHS Officer, along with the Community Relations Officer, to ensure that the program objectives are accomplished.

8.2.3 Notification for Meetings

Stakeholders will be informed about Project updates through some or all of the following methods:

- mass media (newspapers, posters, radio, television);
- direct communication in local languages;
- open-houses (field offices, Project site);
- illustrated pamphlets;
- public meetings;
- Informing appropriate community leaders.

A two-week notice, followed by a three-day reminder notice will be provided for such meetings.

Minutes of consultation meetings will be made available to the meeting participants and other identified interested parties within two weeks from the meeting date. Minutes will be written in an understandable manner and can be obtained from the Project office or other location agreed.

8.2.4 Grievance Mechanisms

Despite the best public consultation and community relations efforts, inevitably there will be circumstances that arise where the company and stakeholders disagree. The following mechanisms will ensure that grievances can be properly filed, and that fair and appropriate consideration will be given to those issues.

- The EHS Officer, with the Community Relations Officer and the Community Development Management Committee will be responsible to build relationships with the surrounding population and communities and to collect and disseminate information.
- Public and individual meetings will be held on a regular basis to provide a forum for open communications.
- Relationships will be built with government offices (local, regional, and national levels), affected Community Authorities and the Community Development Management Committee and their participation in consultation meetings will be encouraged to facilitate communications.
- Formal meetings with individual stakeholders and STL personnel will be held as needed to ensure follow up and confidentiality on identified issues and concerns.
- A formal process or plan for receiving and responding to grievances will be developed and implemented by the Community Development Management Committee and approved by the Community Relations Officer and EHS Officer. This plan will address the following requirements:
 - All grievances will be documented into a central registry or filing system
 - Receipt of all grievances will be acknowledged, by letter or other means, as soon as possible, and no later than 7 days after receipt.
 - The grievance will be reviewed by the Community Development Management Committee and appropriate action taken or implemented.
 - Multiple grievances by the same person, or different persons which address the same or similar issue, will be considered together and will warrant additional attention.
 - The Community Development Management Committee will provide a report through the Community Relations Officer to the EHS Officer on a bi-monthly

basis summarizing grievances received, actions taken, and any outstanding issues to be addressed.

- Relevant (non-confidential) information will be disclosed to the public.
- If necessary, the relevant Government authorities will be notified to share information and address Sierra Leone policy or regulation issues.

8.2.5 Reporting

The Project Manager, through his/her EHS Officer and Community Relations Officer, has the primary responsibility for all public consultation and disclosure monitoring and reporting. The Community Relations Officer will report on the monitoring of Community Development Projects as listed in the CDAP. This will be reported periodically as part of the regular health, safety and environmental monitoring programs.

Additional reports may be developed and provided to the local communities and identified stakeholders on a case-by-case basis. This will primarily be through the feedback at regularly scheduled meetings. Copies of these reports will also be provided to the relevant government agencies of Sierra Leone such as the EPA-SL.

Information sheets and posters may be appropriate for reporting on some items and issues. Radio broadcasting and/or direct communication may be used for Project updating in the affected communities which have a low literacy rate.

8.3 Public Consultation During ESIA Study

Some amount of Public Consultation has already started during the execution of the Social Impact Assessment aspect of the ESIA. CEMMATS undertook a socio-economic survey of the project area in the form of questionnaires administered to households (specifically landowners) in the project area. Focus group discussions with various categories of people within the project area including farmers and members of the general public were also held.

To commence the Focus Group Discussions and meetings, the Social Assessment team leader disclosed the project to the participants by informing them of the activities and plans of Sierra Tropical project, explaining the role of CEMMATS in carrying out the Environmental and Social Impact Assessment Study.

During these meetings, participants were asked about their perceptions of the project; participants were generally enthusiastic about the project but stressed the importance of direct communication and lease arrangements with landowners instead of through local authorities or other proxies.

The minutes of all meetings and discussion held as part of the PCDP process during the ESIA study can be found in the Appendices of Volume 1 of this report (The Main ESIA Report).

9 CLOSURE PLAN

9.1 Decommissioning

It is not expected that this project will end in the closure of established plantations or agricultural facilities. Should the project reach its end of life, it is most likely that the facilities would be sold to another agricultural enterprise. In this option, offices, residences and other ancillary facilities structures would not need to undergo decommissioning.

However the extreme situation in which complete decommissioning may be required is being considered, with measures highlighted for successful closure.

Once it is determined that no further pineapple/tropical fruits operations are feasible, temporary structures, equipment and materials would be removed, sold for scrap or demolished and buried on site after removal of all industrial wastes. Any contaminated soil on site at decommissioning would either be remediated on site or containerized and shipped off site as hazardous waste. Water bodies will be tested for pollution from fertilizers or pesticides and treated accordingly where pollution is identified.

9.2 Reclamation and Closure Plan

9.2.1 Approach

This plan details action to be taken to ensure the site is chemically and physically stable in the event that the closure of operations results in removal of plantations. It aims to ensure that the land is returned, to the extent feasible, to an appropriate end land use as determined through the ESIA.

For final closure and reclamation, where feasible, contours created during plantation would be graded to blend into the natural surroundings as much as possible, and any compacted surfaces would be scarified. Soil tests will be taken to determine its fertility. This will be followed by soil treatment where it is determined that the soil is no longer viable.

Post closure monitoring will be carried out for a number of years in conjunction with other post closure environmental monitoring to ensure the land is returned to productivity, as determined by the end land use, without further intervention.

9.3 Objectives

The objective of the reclamation and closure program is to restore the project areas to its pre-project state or else convert into some other income generating end use.

An inventory of all the areas of the facility will be carried out to identify which will need to be addressed for closure.

9.4 Closure and Reclamation Methods

General closure and reclamation activities relevant to the operation are discussed in this section as follows:

- Surface Grading;
- Sediment and Erosion Control;
- Seed and Plant Propagation;
- Re-vegetation Monitoring.

9.4.1 Surface Grading

All disturbed areas will be graded as near as possible to original contours, and as necessary to obtain free drainage conditions.

All structures and equipment used in nursery and plantation operations will be removed. Access roads will be graded and closed except for agreed upon access roads. Constructed roads at the plantation site will be re-graded to match the natural relief of the surrounding area.

9.4.2 Sediment and Erosion Control

All established plantation areas will be graded to obtain free draining conditions to avoid soil erosion. Sediment traps will be installed, particularly in the early days when soil is loose after uprooting of trees. Cover crops may then be planted, as agreed upon with community members, to further limit the potential for erosion.

9.4.3 Seed and Plant Propagation

The closure plan will re-establish grassland and/or forest settings on the areas previously covered by fruit/crop production, as agreed upon with local community members. The permanent seed mixtures may include native species appropriate for the area. Vegetation will consist of tree and shrub types, and a grass seed mix that is native to the area. Introduced vegetation species will be considered to add for their benefits to add organic matter to soils.

9.4.4 Re-vegetation Monitoring

Post closure monitoring will be carried out for at least 3 years to monitor the progress of crops and to address any issues that may arise in the early days.

9.5 Implementation Schedule and Costs

9.5.1 Closure and Reclamation Schedule

Once operations are completed in the area, final closure activities will commence. Upon completion of final closure, areas will also be monitored for a 3-year period to evaluate program performance.

9.5.2 Financial provision

The company is theoretically budgeting a sum of \$80,000 for closure and reclamation of the plantations, based on the fact that minimal closure will be required as the operation will not disturb the land to a large extent. As previously stated, it is also highly unlikely that the project closure will result in removal of tropical fruit trees/crops from the project lands.

9.5.3 Stakeholder Consultation

The consultation process will involve discussions on closure options and will provide local communities with an opportunity to become involved in the various stages of the planning.

10 MANAGEMENT, MITIGATION, MONITORING AND IMPLEMENTATION MEASURES

10.1 MANAGEMENT PLANS

The management plans will be further refined and detailed for each phase of the project closer to the time the phase is initiated. Plans for monitoring within the plantation areas are also proposed and key personnel with responsibilities identified. An attempt has also been made to cost the monitoring programme. The overall accountability for the implementation of this plan lies with the Company management though various parties will remain responsible for certain activities. The management will remain accountable for ensuring that the mitigation measures, monitoring and corrective actions are implemented.

The following table outlines the monitoring plans required to be implemented.

Table 10.1-1: Management Plans and estimated costs

Issue	Objective	Mitigation measure	Performance target	Responsible party/Parties	Cost US\$/annum
Noise management	Minimize noise impact	<ul style="list-style-type: none"> • Vehicles to be switched off when not in use • Regular maintenance of vehicles and farm machinery to ensure silencing equipment are effective i.e. exhaust mufflers and that they are operating within normal noise levels. • Implement monitoring programme 	<ul style="list-style-type: none"> • Vehicles and machinery to be serviced according to their respective handbooks; • Training programmes for drivers organised regularly • Regular reporting on monitoring activities and results within company and to EPA-SL 	EHS Officer/Engineering Manager	\$15,000
Air Quality	<ul style="list-style-type: none"> • Monitor dust levels and identify sources of generation • To reduce the negative 	<ul style="list-style-type: none"> • Regular maintenance of vehicles and machines. • Implement monitoring programme 	<ul style="list-style-type: none"> • Reduce emissions from unpaved roads and loose soil from site preparation • Good vehicle and machine 	EHS Officer/Engineering Manager	\$15,000 (road spraying and monitoring costs)

Issue	Objective	Mitigation measure	Performance target	Responsible party/Parties	Cost US\$/annum
	impacts of vehicle and machine exhaust fumes.		maintenance records		
Surface and Groundwater sources	<ul style="list-style-type: none"> Impact of pollution on water resources. Impact of water abstraction activities 	<ul style="list-style-type: none"> Implement regular water sampling for laboratory testing to monitor possible contamination from project activities. Water level monitoring of surface and groundwater. 	Prevent project related contamination of community water sources. Ensure company meets national standards for surface and ground water in relation to project activities	EHS Officer	\$25,000

Issue	Objective	Mitigation measure	Performance target	Responsible party/Parties	Cost US\$/annum
Loss of Biodiversity	Minimise impacts resulting from vegetation clearing	<p>Prior to any land clearing and development, a comprehensive HCV Assessment/Biodiversity study will be initiated. The study will be led by an environmental scientist from the Dole Philippines Research department with assistance from local students at the nearby Njala University.</p> <p>The study will focus on the inter-relationship between agro-diversity conservation and sustainable use and development practices in Dole Plantations, including the proposed plantations in the Lugbu Chiefdom with emphasis on biodiversity.</p>	Healthy, thriving ecosystem	EHS Officer/External Consultant	\$35,000
	<p>Ecological Monitoring: Encourage the development of ecological habitats while monitoring ecological patterns to detect any changes which may indicate impact from project activities or other sources</p>	<ul style="list-style-type: none"> • Ecological monitoring will be conducted within project area; creating this database will serve as an indicator of an issue, which may require attention, if normal ecological patterns were to change. • Ecological monitoring through sightings, droppings, calls, trails, etc; these will be documented. 			

Issue	Objective	Mitigation measure	Performance target	Responsible party/Parties	Cost US\$/annum
Waste Management	Ensure the safe disposal of the various types of waste generated by the project to prevent health and environmental hazards	<ul style="list-style-type: none"> • Implementation of an effective Waste Management System taking into account the various kinds of waste to be generated during this phase. • Institutionalization of monitoring systems to ensure the efficacy of the handling, storage and disposal measures are put in place 	Effective waste management system	EHS Officer	\$20,000
Community Consultations	To optimise community relations through the successful implementation of the community development action plan and the public consultation plan.	<ul style="list-style-type: none"> • Encourage and invest in alternative livelihoods development such that the local area is not reliant to any significant degree on the project for employment and economic opportunities; this would be particularly beneficial to families which have lost land to the project. • Engage families in outgrower scheme • Develop a project specific protocol for the fair treatment and employment of locals. • Create relevant committees for the transparent implementation of Community Development Programmes. • Hold regular consultations with communities on project issues; also use opportunity to sensitize on environmental, health and safety issues. 	Successful implementation of the CDAP and PCDP	EHS Officer/Community Relations Officer	\$20,000

Issue	Objective	Mitigation measure	Performance target	Responsible party/Parties	Cost US\$/annum
		<ul style="list-style-type: none"> Work in partnership with existing government and related organisations already well-established to promote local economic development 			
Occupational Health and Safety	Ensure the safety of STL workers	<p>STL intends to maintain the safety of its workers through the following means:</p> <ul style="list-style-type: none"> On the job training Provision of PPE Conducting risk assessments Maintenance of machinery and equipment Implementation of Management and Monitoring Plans. 	Minimise and eliminate where possible, the risk of worker injury	EHS Officer/workforce	\$15,000 (i.e. training and implementation of monitoring plans; other costs already covered in project budget)
Community Health and Safety	Ensure the safety of community from potential hazards resulting from the project.	Regular community consultations and community health and safety sensitization will be conducted periodically throughout the life of the project.		EHS Officer/Community Relations Officer	Covered under Community Consultations

10.2 MONITORING PLANS

Environmental monitoring is an essential tool in relation to environmental management as it provides the basis for rational management decisions regarding impact control. The monitoring program for the project will be undertaken to meet the following objectives:

- To check on whether mitigation and benefit enhancement measures have actually been adopted, and are proving effective in practice;
- To provide a means whereby any impacts which were subject to uncertainty at the time of preparation of the EIA, or which were unforeseen, can be identified, and to provide a basis for formulating appropriate additional impact control measures;
- To provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of future, similar projects.

The following monitoring plans are proposed:

10.2.1 Climate

Climate monitoring (temperature, relative humidity, wind speed/direction, etc.) should be carried out on site in order to detect changes in weather patterns throughout the operation.

10.2.2 Ecology

Monitoring of ecological habitats within the plantations should be carried out to develop a database of flora and fauna thriving within the project area. Changes in ecological patterns may indicate some disturbance from project activities or other causes that may be of concern to the project.

The following High Conservation Value (HCVs) areas will be avoided in setting up new plantations:

- Natural/primary forests within the estate
- Wetlands and swamps
- Buffer and riparian zones
- Water catchment areas including rivers and streams
- Areas with steep slopes
- Private land etc.

10.2.3 Noise Monitoring

It is not expected that noise levels will be particularly high during operations, however it is advisable to implement regular monitoring for record purposes, and also as this is a requirement for quarterly and annual reporting to EPA.

Noise levels for equivalent continuous sound level L_{eq} and peak noise levels will be recorded in dB(A). During noise measurements, observations will be made on noise sources, especially during peak noise level measurements.

10.2.4 Surface and Groundwater Monitoring

A surface and groundwater monitoring plan is proposed throughout the operation and closure phases of the project. Monitoring is carried out to assess whether changes are occurring to the ambient (baseline) water quality of local surface water and aquifers, either as a result of operations (leaching of fertilizers/pesticides), or contamination from other non-project related activities, and to make recommendations for mitigation or remediation of any significant sources of contamination, if identified.

10.2.5 Air Quality Monitoring

Measurement of dust levels PM10 and PM2.5 will be carried out monthly and results included in monitoring reports to EPA-SL.

10.2.6 Community Development Monitoring

Monitor the implementation and success of the Community Development and Public Consultation Plans. This will be done through consultations with communities to get their feedback on the implemented activities, as well as a review of company expenditure in relation to budgeted plans.

10.3 Environmental Management, Monitoring and Training Costs

Costs related to environmental benefit enhancement and mitigation measures, etc. include costs for environmental management, monitoring, training and capacity building. Costs of certain items associated with environmental management and monitoring will be an integral part of specific items incorporated in overall project budgets, and no separate budget is necessary to cover these aspects.

The EHS Officer will manage a department appropriately structured to address environmental health and safety issues. The operating cost of this department is included in the normal budget. There will however be need for periodic independent environmental audits. All the costs associated with implementing the ESMP are included in the overall budget of the project for operations. Other costs for Environmental management have already been alluded to in the section on Environmental management Plans.

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