

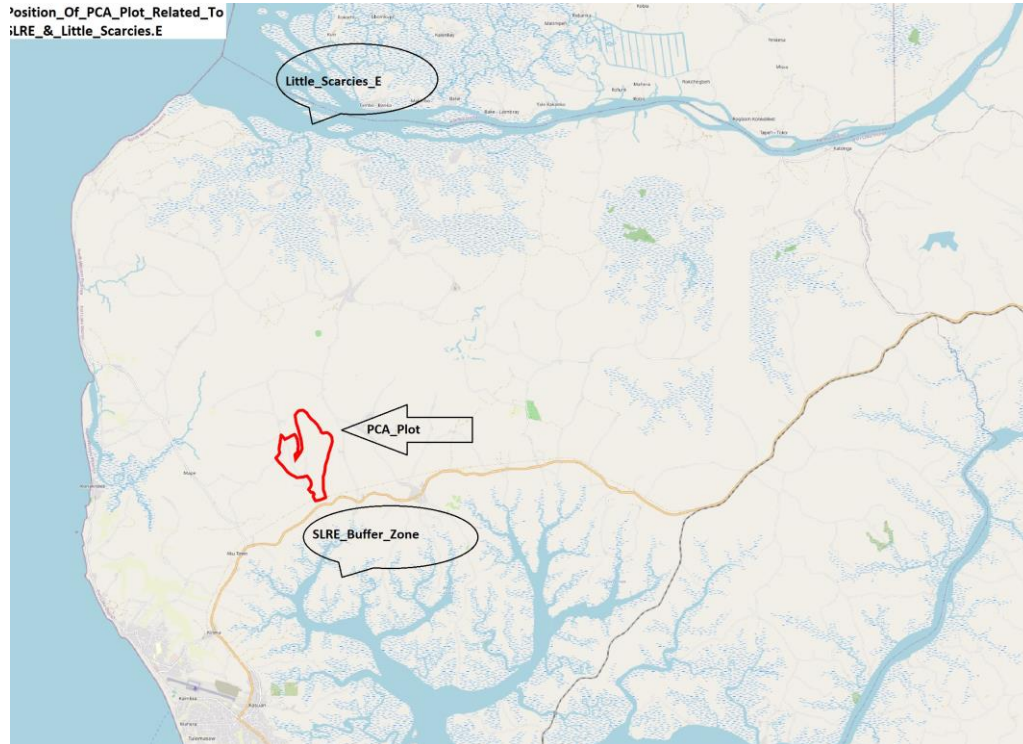
PEE CEE AGRICULTURAL PROJECT

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Draft Environmental and Social Impact Report 2023

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ACRONYMS AND ABBREVIATIONS

| | |
|-------|---|
| CHC | Community Health Centres |
| CHP | Community Health Posts |
| DCP | Decommissioning and Site Closure Plan |
| DHMT | District Health Management Team |
| EIS | Environmental Impact Statements |
| EPA | Environmental Protection Agency |
| ESIA | Environmental and Social Impact Assessment |
| ESMP | Environmental and Social Management Plan |
| GoSL | Government of Sierra Leone |
| GRC | Grievance Redress Committee |
| LEQ | Ambient Noise Levels |
| NTB | National Tourist Board |
| O&M | Operations and Maintenance |
| NPAA | National Protection Area Authority |
| OPs | Operational Policies |
| PAPs | Project Affected Persons |
| PCU | Project Coordinating Unit |
| PM | Particulate Matter |
| IFC | International Finance Corporation |
| IVS | Inland Valley Swamp |
| SLBC | Sierra Leone Broadcasting Corporation |
| SLEDP | Sierra Leone Economic Diversification Project |
| SLS | Sierra Leone Standard |
| SMEDA | Small and Medium Scale Enterprises Development Agency |
| SMMEs | Small, Medium and Micro-enterprises |

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1.0 BACKGROUND

Sierra Leone continues to import onions despite the availability of the required fertile hectares of land for farming. Pee Cee and Sons Enterprise, the major importer of onion (approximately 1000-1100 containers) with about 80% of the market share of Sierra Leone and proponent of Pee Cee Agriculture Limited conceivably, believes that Sierra Leone needs about 1300 - 40' feet containers of onion with an anticipated increase of 10% yearly. Imports are generally subject to import duty, goods and services tax, import excise duty, ECOWAS levy for Non-ECOWAS originating goods, and a declaration processing fee. It is crystal to conclude that given the current state of trading worldwide that transportation and shipping costs will steadily grow over the years. Optimistically, the proponent is of the opinion that, it can control these costs by changing its business strategy, growing onion locally (reduce cost and grow profits) within the next three years.

Pee Cee Agriculture (Herein referred to as PCA Project) has leased 646 hectares of land at Mathen section, engulfing one of the villages (Rogbatha) and bordering three others (Mathen, Forikolo and Rogbereh) at Lokomasama chieftdom in the Port Loko District. With a capital outlay of Five Million (5000000) USD invested and commenced bulb onion cultivation on a 22 hectares within the same concession for a pilot phase. The proponent is seeking funding of USD 25 Million to sustain the required working capital. The loan will be used to grow the business, on expensive upgrades or repairs to land or infrastructure and equipment, etc.

The transformation from importing onions to locally growing them would have significant benefits to the economy such as; Job creation and empowerment. Stimulating economic activities that can attract foreign investments. Training and development of the local workforce thereby creating the foundations for a skilled workforce in the future. Reduced dependence on imports and related external factors (such as fluctuations in world economic factors) contribute to the Gross Domestic Product of Sierra Leone and neighboring countries. Export onion goods to the neighboring countries. It is expected that the strategy will have a positive effect on the foreign exchange and banking system through the creation of a supply chain network.

Despite the best of intentions, the project is expected to have some environmental and social implications.

As required by the Environmental Protection Agency Act, 2008 and the EPA (Amendment) Act, 2010 and in line with the International Finance Corporation requirement on environmental and social sustainability, an Environmental and Social Impact Assessment (ESIA) must be conducted for an undertaking of this nature. This report has been prepared to satisfy that requirement.

1.2 Objective of the Project

The objective of the project is to strengthening the business enabling environment through;

- Job creation and empowerment
- Stimulating economic activities that can attract foreign investments.
- Training and development of the local workforce thereby creating the foundations for a skilled workforce in the future.
- Reduced dependence on imports and related external factors (such as fluctuations in world economic factors) contribute to the Gross Domestic Product of Sierra Leone and neighbouring countries.
- Export onion goods to the neighbouring countries.

1.3 Purpose of the ESIA

The scope of work for the ESIA study is to among other things:

- Provide technical description of the proposed project and identify all activities of environmental/social concern;
- Establish the existing environmental and socio-economic baseline conditions of the project area of influence;
- Predict and examine all the significant environmental impacts on the surrounding communities and the general environment during implementation of the proposed project and advise on appropriate mitigation and abatement measures against potential adverse impacts;
- Provide a monitoring program for predicted impacts;
- Provide an Environmental and Social Management Plan (ESMP);
- Document the socio-economic and cultural advantages and disadvantages associated with the proposed project for stakeholders and interested groups to make an informed decision on the level of environmental compromise and permitting.
- Provide framework to guide the development of an emergency response plan for the project;
- Provide guidelines to be followed in the event of decommissioning; and
- Carry out public consultations and include the outcome in the ESIA report with arrangements to address stakeholder concerns.

1.4 The EIA Process

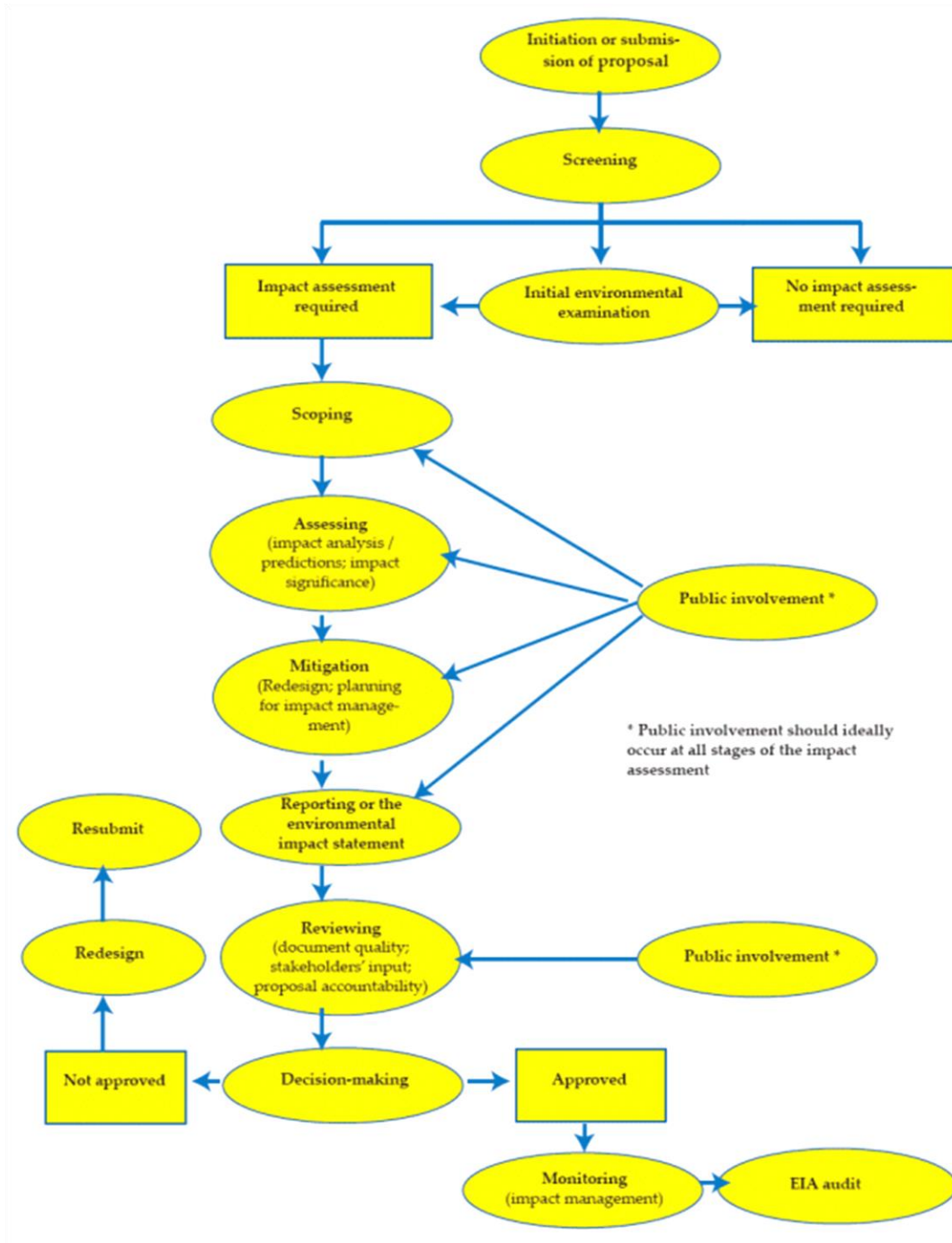


Figure 1: Flowchart of key steps in the environmental impact assessment procedure (from UNEP/CBD/SBSTTA/7/13 and Ramsar Wise Use Handbook 11)

1.5 Methodology for the Assessment Process

This report has been prepared in accordance with applicable IFC and Sierra Leone environmental assessment guidelines and involves the following activities:

1.5.1 Field Survey and Data gathering;

The Consultant assembled and evaluated relevant baseline data relating to the biophysical and socio-economic environment to be influenced by the project. Furthermore, surveys and observation of the project area were carried out between the months of August, Sept and October 2022 and February 2023 to confirm relevant baseline environmental issues and conditions to be affected or are likely to develop from the project implementation including the following:

Land acquisition, ownership, land use and Biodiversity assessment in particular, the physical setting of the rural environment in the project area of influence; Physical characteristics like Climate, topography, relief, and vegetation of the area; Water bodies within the project area including both surface and groundwater; Community water use as well as sanitation issues; Socioeconomic and cultural conditions within the project area; and Health issues including water-related diseases such as guinea worm, blackflies in the project districts. In addition, this report has scoped out the issues and provided general assessment of the impacts.

1.5.2 Stakeholder identification and consultations

Key stakeholders identified include Pee Cee and Sons, Ministry of Agriculture and Food Security, Ministry of Environment, Ministry of Trade and Industry, Ministry of Lands, Country Planning and Housing, Environmental Protection Agency (EPA) of Sierra Leone, National Tourist Board (NTB), Sierra Leone investment and promotion board (SLIEPA) National protected Area Authority, Project Management Team for Sierra Leone Wetlands Conservation Project, Ministry of Health, Public Private Partnership (PPP) Conservation Society of Sierra Leone etc. The outcome of engagements with key stakeholders have been reviewed and incorporated in the study.

Data collation and analysis; The report preparation involved review of project documents, related Environmental Impact Statements (EIS), as well as EPA, GoSL and IFC reference documents as follows:

- Project Documents (Project Implementation Document);
- District Profile for the Port Loko District;
- Sierra Leone River Estuary-Management Plan 2016-2020.
- Sierra Leone River Estuary -PRA Report March 2015
- Mobonda Community Conservation Project: Chimpanzees, oysters, and community engagement in Sierra Leone
- Medium Term Development Plan;
- Sierra Leone Midterm Census, 2021;
- Technical sheets for PCA project development;
- Sierra Leone EPA Guidelines
- GoSL and IFC Reference Documents
- Sector policy documents and regulations; and
- Relevant international conventions.
- Agricultural Sector Rehabilitation Project
- Food Security Policy (FSP)
- Agriculture for Development (A4D)
- Sierra Leone - Biodiversity Conservation Project
- Climate Change adaption Report
- Diversify Food Production Project (DFPP) •
- Global Agriculture and Food
- Pest Management Plan (PMP)
- PCA Project Business Plan
- Proposed Babator Farming Hub Project, December 2015
- Draft EIS: Proposed Sisili Kulpawn Irrigation Project, December 2013;

1.5.3 Other Government Institutions

Traditional Leaders and Local council , Local community leaders in each of the four communities' where affected farmers live, Civil Society Groups, Farmers Based Organization, Community Based Organizations, Traditional Leaders and Local council, Local community leaders in communities where affected farmers live;

- Mathen
- Forikolo
- Rogbatha and;
- Rogberek

Tribal authorities and community opinion leaders consulted are as follows

- Section Chiefs
- Traditional and cultural leaders
- Head man
- Youth leader
- Councillor
- Honourable Member of Parliament
- Resident Minister North West.
- Teacher's union leaders
- National protected area authority forest rangers
- Hunters and swamp users
- Head of religious leader
- Head of the women leader in each community

1.6 The ESIA Report Content and Structure

EPA-SL guidelines for preparation of ESIA and the International Finance corporation's performance standards (P.S) guided the preparation of this ESIA report. The outline of the report includes the following:

- A non-technical executive summary;
- An introduction describing the ESIA purpose, objectives, approach and methodology;
- A description of the project, with an emphasis on project scope;
- Analysis of alternatives;
- Policy, legal and administrative framework;
- Baseline environmental and social conditions of the Western Area Rural District of Sierra Leone;
- Potential environmental and social issues and impacts;
- Proposed mitigation measures;
- Environmental And Social Monitoring Plan
- Environmental and social monitoring plan with costing
- Provisional Environmental Management Plan
- Program to Meet Requirements
- Environmental Monitoring Programs
- Decommissioning Plan
- Conclusion **and:**
- Annexes.

2.0 DESCRIPTION OF PROJECT

Plate 1: Project Concession



The proposed farm area includes ecological sensitive area. The main access road transveres the communities of Mathen, Forikolo and Rogbatha on one end and a separate road to Rogbereh along the Port Loko –Komrabai highway.

Some basic infrastructures and facilities exists close within the project concession such as schools (Mathen and Forikolo) whiles the main health facilities serving the entire communities is located in Mathen within the concession leased area. The presence of PCA project development is of safety concern for pupils, health care workers and patience’s as well as locals that ply the road and domestic animal population.

2.1 Project development and current status

The PCA onion farm (project) is presently at its operational phase of Onion cultivation on a 22 Hectares of land space. The present cultivation space is situated at Mathen portion along the main access road connected Mathen Village to Forikolo and ends in less than 40 meters to the Rogbatha village without buffer zone created.

The project development commenced late 2022 within the Rogbatha community land portion on a 22 hectares. Land clearing is completed, ploughing, Drilled two (2) Boreholes, and decommissioned one of the boreholes due to perceived impact on the Forikolo water table, installation of drip irrigation systems, construction of facility building and temporary warehouse. A sea container deposited also as temporary office for technical team office space.

2.2 Project Scope

The project is aimed at the maximization of onions production locally. It's a transformation of a business model from importing onions to locally growing them as an alternative access, availability and affordability of onion. The farming area and host communities essentially, coalesce into one entity and as such all project component would serve to not only enhance the locals experience but also secure essential daily quality of life for the residents.

All support infrastructure would by design , be integrally linked to the village system, the mechanized farming system and produce will contribute to local economic development not only by creating opportunity for access to affordable and availability of onion but also contribute to food security . Moreover, the project seeks to enable existing pee cee and sons' onion supply business to not only run more efficiently but also increase the quality of the offer and, thus, become a stimulus for growth.

2.3 Project Facilities

- Office space and administrative building
- Staff shelter and canteen
- Warehouse for farming equipment and tool
- Post-harvest Processing centres
- Appropriate custom signage system including interpretive panels, path signs and roadside directional signs.
- Electrification poles installation and wiring
- Waste management unit (closed shaded structure, wood with thatched roof, including an organic waste composting area).
- Connection to telecommunication network (wire/wireless).
- Diesel generator backed up with solar power micro-grid
- Waste water system (PVC pipe, including manholes, etc.).
- Renovation of the existing borehole and upgrading of the water system

2.4 Project Site Infrastructures and Utilities

- Photovoltaic Solar Energy System
- A reverse osmosis (RO) system to ensure fresh water supply,
- A small scale wastewater treatment facility to ensure proper treatment of the waste water produced by the facilities.
- Construction of toilets and washroom facilities at certain distance within the concession as the farm developmental phase increases.
- All toilet will be composting toilet (simple masonry building with roofing panels)
- The recommended material for roofing is polyethylene-aluminium roof
- Installation of drip Irrigation system
- Vehicle parking lots
- Furniture appropriate to the site (bins for recycling, Motorcycle Park, benches, chaise etc.)

Table 1: Project Equipment and tools

| | |
|--|-----------------------|
| • Tractor | • Spray Equipment |
| • Soil Cultivator | • Watering Cans |
| • Plough | • Garden Folk |
| • Harrow (e.g. Spike Harrow, Drag Harrow, etc.) | • Rake and Hoe |
| • Broadcast Seeder (alternatively- Broadcast Spreader) | • Slasher |
| • Planter | • Sickle |
| • Plastic Mulch Layer | • Shovel |
| • Transplanted | • Sprayer |
| • Sprinkler System Irrigation | • Gumboots and Gloves |
| • Mower | • Nose and Mouth Mask |
| • Sickle | • Truck |
| • Wheelbarrow | |

2.5 Waste Management

Municipal waste generated will be collected in bins or similar placed at suitable points. A well separated space/area will be designated to temporarily collect/sort/recycle solid waste before it is taken to the municipal dump site.

Sewage generated on site will be managed using a small-scale wastewater treatment facility, the biorock system. The Biorock system is a compact non-electric residential waste water treatment plant that includes a primary tank which clarifies the raw sewage by dividing fats, oils, greases and organic solids. The water then goes through an effluent filter and then enters a bioreactor. In the bioreactor, wastewater is additionally purified with a biological process. Finally, the effluent is discharged by gravity or by a pump in accordance with the ground type.

The wastewater enters a primary tank for the separation and breakdown of organic solids (primary treatment), then it gets to the effluent filter before getting to the secondary treatment that includes an aerobic digestion process. In addition, both the primary tank and the bioreactor are aerated naturally.

When gravity discharge is not possible, a pumping well is added to the system. The effluent water can be used for groundwater recharging or irrigation, due to its high quality. The system has low carbon footprint and minimum annual maintenance efforts. Biorock also offers a multiple system for larger number of users. In this case, after the primary tanks a flow control chamber is positioned in order to distribute water evenly. A splitter box than splits water in multiple biorock units.

2.6 Signage System

Appropriate custom signage system including interpretive panels, path signs, roadside directional signs, and so forth will be installed at the site.

- The signage system proposed is based on the study of existing contemporary signage systems of similar contexts and inspired to the specific identity of Sierra Leone, related to its “green and blue” heritage and its culture of hospitality.
- The design concept is based on clarity and usability: everybody must see and interpret the signs easily. The size of the font and the use of pictograms and pictures is designed in order to facilitate understanding.
- The system is designed to be easily produced and replaced by local communities, by using local woods and craft skills.
- The types of signs included in the system are the following.
- Welcome signs. They welcome the regulators and visitors arriving at the destination and are located at the entrance of the sites.
- Orientation maps. They are essential for orientation, must be placed at carefully planned locations, based on customised maps with international symbols, enhanced readability, easy interpretation, including any defined trail with departure and arrival point, key attractions, facilities and safety instructions.
- Path signs. They provide guidance on the pathway that visitors should follow to easily move around the target area. Density of signs should be adequate to the environment but in principle they must be sufficient to ensure safe and easy circulation. If on pedestrian trails, it is advisable to ensure that at least one sign is always visible (1/50m minimum). The system includes pedestrian path signs, along walking trails; the directional pole, visible to both pedestrians and vehicles; and roadside directional signs along the main and secondary access roads.
- Interpretation signs. They deliver information on the site to the visitor and add value to his/her experience.
- Services and facilities. Signs giving directions for visitors’ facilities and amenities such as toilets, food and beverage, information centres, etc. are included in the path signs systems.
- Regulations and “no littering” signs. They provide regulations to be followed by visitors on beaches and natural areas.

2.7 PROPOSED PROJECT ACTIVITIES

2.7.1 Preparatory Phase Activities

2.7.1 Proposed Pre-farming and Construction Phase activities

- Survey and site selection;
- Project feasibility studies and soil assessments;
- Preparation of Environmental and Social Impact Assessment (ESIA) report and Environmental and Social Management Plans (ESMPs);
- Material sourcing arrangements/contracts; and
- Mobilisation of farm architects /engineers, agronomists etc and construction staff.

2.7.1.1 Survey and site selection

The project site was surveyed to ascertain the suitability of the site for the proposed project and to appreciate any challenges that may hinder implementation. Approval for survey drawing will be obtained from the relevant authorities before project implementation.

2.7.1.2 Project feasibility studies and Geotechnical assessments

- Project feasibility studies will be conducted to confirm the viability of the project. Also, soil quality assessments will be carried out to determine the suitability of the soil for the project and required improvements, if any.
- Preparation of Environmental and Social Impact Assessment (ESIA) report and Environmental and Social Management Plans (ESMPs);
- The ESIA and ESMPs as required by law and international best practice, will be prepared to obtain environmental approval for the execution of the project.

2.7.1.3 Material Sourcing Arrangements/Contracts

Materials and equipment for farming and construction would be sourced locally, legally and documented. Sourcing will be from permitted producers or suppliers and copies of permits will be obtained before procurement, especially raw materials like sand and gravels. Materials and equipment not available locally would be sourced abroad.

2.7.1.4 Mobilization of project development staff

Majority of land preparation and construction workers both skilled and unskilled are expected to be employed from the surrounding communities. However, for unavailable skills, persons outside the local communities will be engaged.

Worker welfare facilities will be provided and shall be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers. It will meet national legislation and international good practice in relation, but not restricted, to the following; the provision of minimum amounts of space for each worker; provision of sanitary, facilities and potable water; any health, fire safety or other hazards or disturbances and local facilities; the provision of first aid and medical facilities.

2.7.1.5 Farming and Construction Phase Activities

Construction phase activities, as described in Section 2.2 above, include among others:

- Mobilisation and transportation of equipment to project site;
- installation of appropriate signage;
- Construction of parking bays;
- Construction of toilets and showers;
- Construction of waste treatment system.
- Expatriate staff resident
- 40 Feet Sea transport containers
- Maintenance department
- Raw material warehouse

2.7.2 Operation Phase Activity

2.7.2.1 Project Land Demarcations

The PCA project developmental phase activities are ongoing concurrently within the land portion of Rogbatha village. Situated South-East of Mathen village and North –East of Forikolo communities respectively. The farm is equipped with new GPS equipment for land levelling and development. Levelling of the fields to completely flat areas, is work in progress.

Land Preparation

- Involves land clearing, ploughing, harrowing; rotovating, and bed-shaping and installation of irrigation systems.
- Operation phase activities will be mainly, onion and other seasonal produce farming processes, integrally, maintenance and management of the project facilities. Operation and maintenance will be the responsibility of the facility manager that will be selected through competence selection criteria or other suitable arrangement. There will be routine and emergency maintenance of the facilities as per the facility manager’s Operations and Maintenance (O&M) procedures.
- The long term goal includes, to establish a large scale commercial onion harvest based on mechanized irrigation in dry season. In bringing forward best produce the project works in collaboration with a senior agronomist, in Partnership with International Finance Corporation (IFC) to produce onions not only for Sierra Leone’s market but also for export.

Plate 2: Existing farm site (Pilot)



2.7.3 Land Preparation and Development

2.7.3.1 Agronomic Practices associated with Crops to be Cultivated

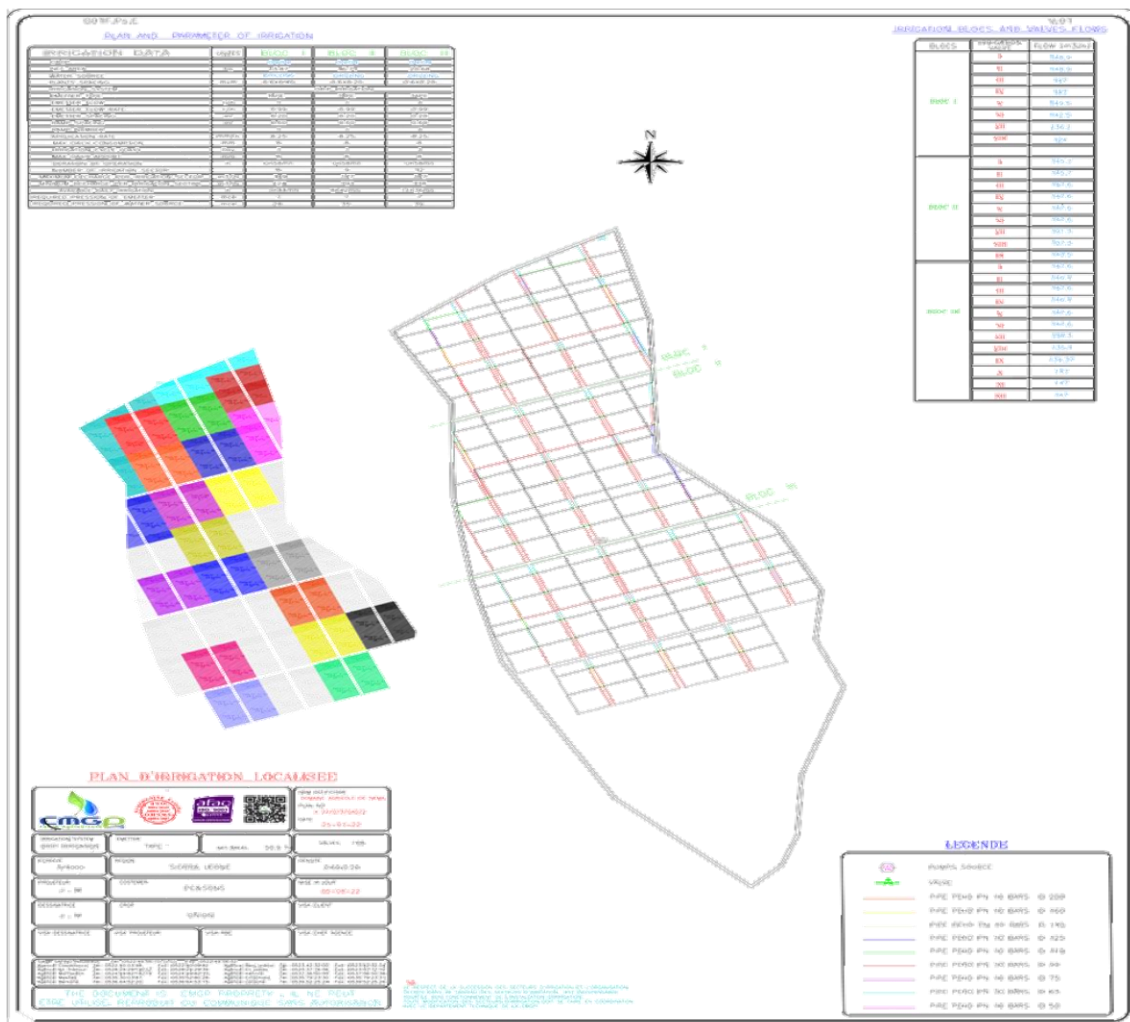
- The choice of preparation method should be made based on the clay content of the soil. The focus should be to reduce compaction and erosion, where on heavier soils it will be to reduce crust formation. Soil preparation should be done to depths varying between 200-400mm. Ridging is highly recommended and should be done according to the land contours. The main advantage of ridging an onion crop is to keep excess water away from the plant, improved oxygenation of the root zone, increased soil depth in the growing bed, to promote bulb development.
- Bush Clearing/Stomping:-Vegetation clearing will involve felling of trees and stumping which will be done using commercial bulldozers, chainsaw and excavators. After the trees are felled, some of these trees may be given to the locals for firewood and charcoal so as to deter them from cutting more trees, especially during this period of development.
- Ploughing and Harrowing:-Minimum primary ploughing and a secondary operation such as harrowing will be done using a rotatory hoe of disc mounted on a tractor as a good practice to produce good seed bed for planting of crops and to ensure that the land is free from weeds at planting time ;
- Planting:-this will involve the sowing of seeds of selected crops either by mechanical means such as the use of a planter or by manual methods of sowing such as the 'dibbling' method and broadcasting method;
- Weed Control/chemical:-Weeds will be effectively controlled with herbicides or mechanical weeding. This will be done at the pre- and post-emergence stages;
- Fertilizer Application: - fertilizers will be applied using "NPK" fertilizer applied just before planting. The second fertilization or top dressing will be done using Urea with 0.5 bag per acre. Other chemicals which will be applied include Sulphate of Ammonia
- Harvesting/ shelling: -Crops will be harvested using combine harvesters and human Labour.

2.7.4 Water Source, Requirements and Irrigation

Water for irrigation and other farming activities shall be sourced from project boreholes (present and future). Rain water shall be harvested during the rains and it is expected to serve other domestic and sanitary purposes and also used to supplement irrigation purposes.

Reference to PCA Project documents highlights that Onions require approximately 400 to 600 mm of water during the growing season. A drip irrigation system will be used for the pilot phase and will work great, though expensive to install. A 6 inch pump has been connected to the borehole, expected to provide 80 cubic meter an hour of water. Irrigation will depend on soil and climatic conditions with a 5-8 days interval

Plate 3. Irrigation plan for the pilot phase



Source: Pee Cee Project IR Map

Water Resource and Availability

The entire Lokomasama chiefdom (the host chiefdom of the PCA farm) is embedded between two estuaries that constitutes a reliable water source for the chiefdom. The topography of the PCA leased concession as well as the host communities can be classed as a high water table environment. As an ecotone, water well or borehole have a high recharge possibilities.

The technical facility report of borehole drilled at 70 meters with a pump size of 17HP set at 73m and a flow rate of 82.0 m³/h remained a constant discharge. Water level of 6.92m at a sustainable rate of 24 hrs indicates that the underground aquifer has enough fresh water. The surface aquifers yield remains all year round from the water wells at the Mathen community, the hospital compound. Forikolo community water well, not excluding the one at the school maintained considerable amount water through the dry season.

Installation of Project Energy need Infrastructures

The project energy need will be sourced from diesel powered generators and photovoltaic solar energy. This shall be installed and managed by the farm electrical engineers and serviced by the suppliers. The system wastes or damaged battery management plan is required to be submitted by the contractors as part of the contract requirements

3.0 ALTERNATIVE CONSIDERATION

The table below present the alternation consideration for different aspect of the project

Table 2: PCA Project Alternative Consideration

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|------------------------------|---|--|---|
| Land | | | |
| 1. Lokomasama | <p>Advantage</p> <ol style="list-style-type: none"> 1. Abundant land and underutilization of farm land 2. Forest has be depleted 3. Ideal soil for onion farming 4. Existing farm bush 5. Can motivate local as outgrowers with its associated benefits 6. Will sustain the legacy of Lungi as onion farmers 7. Location is close to the sea port and airport for import and export of farm tools and produce. 8. Improve socio-economic status of Mathen community and Lokomasama as well as livelihood of the locals if properly managed. 9. Add values to tourism as the development will improve tourist attractions, views and bird watchers. | <p>Disadvantage</p> <p>Project is located in an ecological sensitive environment of conservation concern and impact on it adversely.</p> <p>Requires off-set payment from the relevant national authority to use the ecology</p> <p>Potential for contest with IUCN of the conservation aspects considerations.</p> <p>Despite the forest and forest cover degradation, hunting and primitive farming practices, the swamps remained breeding ground for sea creatures and migrant bird.</p> | <p>Option 3 is the preferred option for the project as the advantages make it the overwhelming choice.</p> |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|------------------------------|---|--|------------------|
| | <p>Can dilute and modify largely the Mathen community Biological and Social Ecosystem.</p> <p>Land dispute might trigger conflict between distant family members of land owners and the project for land acquisition and regularization if appropriate stakeholders consultation are not initiated from the onset.</p> <p>Leased concession is an existing farmland (upland and IVS) with patches of subsistence farming identified in each community. Without a practical livelihood restoration plan, Mathen section and the land owners shall be deprived of their source of livelihood.</p> <p>Leased concession vegetation's serves the locals for hunting, fuel wood and source of herbal medicine and craft. The community</p> | | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|--|---|---|------------------|
| | | shall be deprived from such forest resources. | |
| 2. Mange Bureh Port Loko district | <p>Advantages</p> <p>Have swamps and upland</p> <p>Less damage to terrestrial ecology because the forest is already depleted</p> <p>Modified habitat serves as major farming and livelihood source for the people.</p> | <p>Disadvantage</p> <p>Will deprive larger number of farmers compared to Lokomasama subsistence farming trend</p> <p>Will impact directly on the little and Great Scarcies river estuary</p> <p>Longer distance to seaport</p> | |
| 3. Mahera by Okra Hill. Koya Chiefdom, Port Loko District | <p>Advantage</p> <p>Rokel river as water source and extraction</p> <p>Rich in alluvial soil</p> <p>Highland with abundant natural forest (secondary forest)</p> <p>Less than 50 km to the Seaport in Freetown</p> <p>Connected by a feeder road to the main Freetown-Port Loko Highway.</p> <p>Geographically situated at point that links east west, north and south of the country.</p> | <p>Disadvantages</p> <p>Depletion of forest resources and habitat fragmentation</p> <p>Potential for river pollution and bioaccumulation of aquatic biomass</p> <p>Habitat degradation</p> | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|---|--|--|------------------|
| <p>3. Construction of access road between Mathen and Rogberek</p> | <p>road connecting Mathen from the south, Forikolo at the North and Rogberek down north east and south east of the project enter concession.</p> <p><u>Advantage</u></p> <ol style="list-style-type: none"> 1. High initial cost but sustainable development and mutual benefits to the host community and the project. 2. It creates option for alternative roads and better farm mobility access and road network. 3. No resettlement issues but crop compensations | <p>high accident risk as above.</p> <ol style="list-style-type: none"> 2. Immediate resettlement of Rogbatha residents 3. Adverse impact on the swamp and water table of Rogbatha 4. Proposed access road might not be sustainable because Rogbatha is perceived to be an area where the flood and swamp water submerges and re-surface at komrabai. 5. Requires time to seek necessary permits for the undertaking. <p><u>Disadvantage</u></p> <ol style="list-style-type: none"> 1. Will require time to negotiate. 2. Might impact temporary on the swamp but with engineering design impact could be minimized | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|-------------------------------|--|---|------------------|
| | 4. Reduce potential for project vehicle ,community disturbance, vulnerability and road accident etc | | |
| Irrigation | | | |
| 1. Surface irrigation. | Advantage 1 Low initial cost 2. Easy maintenance of the system 3. Compatibility with all soil types. Based on the slope, the size and shape of the field, the end conditions, and how water flows into and over the field, surface irrigation is classified into: Wild flood irrigation. | Disadvantages <ul style="list-style-type: none"> • Level lands require high accuracy, you cannot use it there. • This is a big no-no for big fields. • Not applicable on soil with a high filtration rate. • Plants are always covered with water even when they do not need it. • Sometimes limited space gets more water than required. | |
| 2. Drip irrigation. | Advantage <ol style="list-style-type: none"> 1. Maximum use of available water. 2. No water being available to weeds. 3. Maximum crop yield. 4. High efficiency in the use of fertilizers. 5. Less weed growth and restricts population of potential hosts. 6. Low labour and relatively low operation cost. 7. No soil erosion. | Disadvantages <ol style="list-style-type: none"> 1. Expensive initial cost can be more than overhead systems (commercial system) 2. The sun can affect the tubes used for drip irrigation, shortening their usable life. 3. If the water is not properly filtered and the equipment not properly maintained, | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|---------------------------------|---|---|------------------|
| | | it can result in clogging. | |
| 4. Sprinkler irrigation. | <p>Advantage</p> <ol style="list-style-type: none"> 1. No terracing required. 2. Suitable to all types of soil except heavy clay. 3. Suitable for irrigating crops where the plant population per unit area is very high. 4. Influences greater conducive micro-climate. 5. Areas located at a higher elevation than the source can be irrigated. | <p>Disadvantages</p> <ol style="list-style-type: none"> 1. Incurs high operation expenses due to the energy needed for pumping, labour and relatively large investment in equipment: sprinklers and pipes. 2. Sensitivity to wind, causing evaporation losses. 3. The unavoidable wetting of foliage in field crops results in increased sensitivity to diseases. | |
| 4. Manual irrigation. | <p>Advantage</p> <ol style="list-style-type: none"> 1. It is the best method of irrigation for levelled fields. 2. It does not require any technical knowledge. 3. This method is more useful in soils having lesser infiltration. 4. In this method, rain water stays in basins, hence soil erosion is not caused. 5. It has lesser economic investment. 6. But it requires more man power for such a vast portion of land 7. Labour intensive and ; 8. Time consuming. | <p>Disadvantage</p> <ol style="list-style-type: none"> 1. Due to seepage in drains, wastage of water is caused. 2. Machines cannot be used in this method because during spray of insecticides or fertilizers, the earthen walls of basins are damaged. 3. There is imbalance in distribution of labour. 4. Creation of problem of water logging. | |
| Center pivot irrigation. | <p>Advantage</p> <ol style="list-style-type: none"> 1. Apply irrigation in a uniform manner. | <p>Disadvantage</p> <ul style="list-style-type: none"> • Cost — the systems have a relatively high | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|-----------------------------------|--|---|---|
| | <ol style="list-style-type: none"> 2. Reduce the need for human labour. 3. Operate at reduced pressures to conserve energy. 4. Prevent water run-off through more efficient water use. 5. Programmable to irrigate on a specific schedule. | <p>capital cost compared to surface irrigation systems, unless substantial land forming is required for optimum performance of the surface system.</p> <ul style="list-style-type: none"> • Energy requirements – these systems require some form of energy source (electric or diesel) to operate. | |
| Electricity supply options | | | |
| 1. National Grid | <p>Advantage</p> <ol style="list-style-type: none"> 1. Not installed and no plan for its installation in the next 12 months | <p>Disadvantages</p> <p>The project cannot operate without energy supply for its needs</p> | <p>As at the loan seeking stage, option 2 is proposed but in the long, Option 3, Hybrid Photovoltaic Micro-grid System is the preferred option for the project as the advantages make it the overwhelming choice.</p> |
| 2. Generator (diesel) | <p>Advantages</p> <ol style="list-style-type: none"> 1. Diesel generators require less maintenance 2. They consume less fuel than gas generators 3. They are durable 4. Has a safe fuel storage 5. They have an enhanced life span 6. Has a continuous power supply 7. They are capable of handling larger power loads and run for | <p>Disadvantages</p> <ol style="list-style-type: none"> 1. They are very noisy in their operation 2. They are expensive 3. Fuel may not be accessible during a blackout 4. They produce carbon dioxide, nitrogen oxide, and other harmful gases that are released into the atmosphere. | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|--|--|--|------------------|
| | longer duration than other types of generators available. | 5. Its heavy components can make repairs expensive. | |
| 3. Hybrid Photovoltaic Microgrid system | <ol style="list-style-type: none"> 1. Continuous Power Supply 2. They utilize renewable sources in the best way 3. Maintenance cost of the hybrid solar energy systems is low as compared to the traditional generators which use diesel as fuel. 4. Works more efficiently than a traditional generator 5. They manage load accordingly. | <ol style="list-style-type: none"> 1. They controlling process may be complicated. 2. High installation cost 3. Less battery life due to exposure to natural elements like heat, and rain. 4. The number of devices connectable to a hybrid solar energy system is limited and vary from system to system. | |
| 4. Solar Panel system | <ol style="list-style-type: none"> 1. Renewable energy source 2. Reduces electricity bills 3. Solar energy can be used for diverse purposes including electricity and heat 4. Low maintenance costs | <ol style="list-style-type: none"> 1. Has a high initial cost 2. Solar panels are dependent on sunlight to effectively collect solar energy. 3. Solar energy storage is expensive 4. Solar PV panels require a lot of space 5. Transportation and installation of solar systems have been associated with the | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|--|--|--|---|
| | | emission of greenhouse gases. | |
| Waste Management Option | | | |
| 1. Composting plant | Advantages <ol style="list-style-type: none"> 1. Improvements in soil quality. 2. Enhances the structure of the soil. 3. Eco-friendly. 4. Fully organic fertilizer. 5. Higher yields. | Disadvantages <ol style="list-style-type: none"> 1. Requires initial investment. 2. Efficiency depends on the amount of organic waste 3. May attract rats, snakes, and bugs. 4. Requires space 5. Unpleasant smell | Municipal Waste Dump/ landfill sites (Option1 and 2) is the preferred option as it is cost effective and localized |
| 2. Waste separation at source | Advantages Zero to landfill. <ol style="list-style-type: none"> 1. Reduce Carbon Footprint. 2. Reduce waste costs. 3. Extract value from waste. 4. Increase recycling. 5. Ensure compliance. 6. Application of Biorock system for sludge separation | Disadvantage <ol style="list-style-type: none"> 1. Exposure to toxic 2. Mishandled waste could result in various skin diseases 3. Breathing issues, 4. Reproductive problems, 5. Growth issues | |
| 3. Municipal Waste Dump/ landfill sites | Advantages <ol style="list-style-type: none"> 1. Straightforward concept to deal with waste. 2. Filled land can be reused for other community purposes. | Disadvantages <ol style="list-style-type: none"> 1. Project cannot create a landfill because it's the mandate of the district authority. | |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|------------------------------|---|--|---|
| | <ol style="list-style-type: none"> 3. Landfills can prevent environmental dumping. 4. Good for waste that is non-recyclable. 5. No existing landfill within the chiefdom | | |
| No Option | | | |
| Finance | <p>Advantages</p> <ol style="list-style-type: none"> 1. Funds for the project implementation could be used for solving other development problems, albeit less dire | <p>Disadvantages</p> <ol style="list-style-type: none"> 1. Non implementation of the project will continue to deprive project communities of access to economic opportunities associated with food security and tourism. Also, locals who would have been offered employment will not continue livelihood activities such as charcoal burning, destruction of the swamp vegetation etc. which degrade the environment. 2. Government will lose revenue and the opportunity to enhance the country's image to harvest onion in large quantity, and | <p>This option is not preferable</p> |

| Option/ Method of Deployment | Potential Environmental, Social, Technological and Economic Implications | | Preferred Option |
|------------------------------|--|--|------------------|
| | | mechanized vegetable farming technics for economic growth. | |

Conclusion

The “no action alternative” is not a desired alternative as it will not address the challenges faced by the country as far as food security and onion provision is concerned. The proposed project will be a positive development if all the suggested solutions to the socioeconomic and environmental impacts identified are implemented.

4.0 RELEVANT POLICIES, LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

The Environmental and Social Impact Assessment (ESIA) is an ongoing process that follows both national and international standards and regulations. This ESIA study therefore, is conducted in line with the national and international regulations and standards, including those of International Finance Institutions (IFI) such as International Financial Cooperation (IFC), Africa Development Bank (AfDB).

National legislations and policies relevant to agricultural sector and the environment have been reviewed in this section together with institutional requirements and international best practice for assessment and management of environmental and social issues which have been considered. These have been summarized in **Table 3** under the following themes:

4.1 Policies and Plans

The policies and plans reviewed and applied in the assessment include:

- National Sustainable Agriculture Development Plan (NSADP)/ Comprehensive Africa Agriculture Development programme (CAADP)
 - 2010 - 2030
 - The National Environmental Policy, 1994
 - The National Lands Policy, 2015
 - The National Water and Sanitation Policy, 2010
 - National Biodiversity Strategic Action Plan 2017
 - The National Action Plan on Gender Based Violence, 2012 – 2016
 - The Sierra Leone National Action Plan 2016 – 2018

In addition to the above, the National Regulatory Framework were also reviewed and include the following:

- Policies and Plans
- National legal framework;
- Local governance, planning and other institutional requirements;
- Public Health, Safety, Security and Social Protection
- Environmental legislation in Sierra Leone; and
- African Development Bank safeguard policies.

Table 3: Relevant Legal Framework and Key Compliance Requirements

| No. | Policies and Plans | Applicability to Proposed Project |
|-----|--|--|
| 1. | <p>National Sustainable Agriculture Development Plan (NSADP) 2010 – 2030 The National Sustainable Agriculture Development Plan (NSADP) is a multi-sectoral instrument with the aim to provide short, medium and long-term Investment programmes in the agriculture sector. The overall objective is to promote economic growth and increased revenues to households, firms and the state so that basic services (health, education, etc.) will be provided to the population. The instrument seeks to make agriculture, forestry and fisheries more productive and sustainable</p> <p>Comprehensive Africa Agriculture Development programme (CAADP) The overall objective of the CAADP is to increase the agriculture sector’s contribution to the national economy. This will be achieved through productivity increases through commercialization and private sector participation. This programme seeks to facilitate and strengthen the productive capacities of small and medium scale farmers, provide an enabling environment to promote large scale farming and development of agribusiness, and facilitate access to markets and value addition. CAADP identify four major investments and these include:</p> <ul style="list-style-type: none"> • The Commodity Commercialization • The Agriculture Infrastructure Development • The Private Sector Promotion • The Sector Coordination and Management | <p>This objective of Pee Cee Agriculture is closely linked with the objectives of NSADP and CAADP, in promoting economic growth through agriculturally led development, participation and promotion of the private sector.</p> <p>Being that Pee Cee Agriculture project is a private sector investment, drawing the attention of the proponent/ investor to NSADP and CAADP is very importance.</p> |

| No. | Policies and Plans | Applicability to Proposed Project |
|-----|--|---|
| 2. | <p><u>The National Environmental Policy, 1994</u> The National Environmental Policy seeks to achieve sustainable development in Sierra Leone through the implementation of sound environmental management systems which will encourage productivity and harmony between man and his environment. The key objective of the policy is to secure for all Sierra Leoneans a quality environment that can adequately provide for their health and well-being. The policy further indicates inter- sectoral synergies in major areas for policy formulation. It takes into consideration major sector goals and policies for enhancing sustainability in environmental management systems.</p> | <p>This policy requires implementation of sound environmental management systems and the project Environmental, Social Management Plan (ESMPs) satisfy this requirement.</p> |
| 3. | <p><u>The National Lands Policy, 2015</u> The National Land Policy is a policy developed to promote the objectives of equal access to sustainable social and economic development. The principles guiding the Land Policy include:</p> <ul style="list-style-type: none"> (1) Protecting the common national or communal property held in trust for the people; (2) Preserving existing rights of private ownership; and (3) Recognizing the private sector as the engine of growth and development, subject to national land-use guidelines and rights of landowners and their descendants. | <p>In fulfilling the guiding principles and ensuring the sustainable operation of the project, the proponent Pee Cee Agriculture identified all the landowning families and the existing rights of communal land tenure and private ownership is respected. Furthermore, the proposed project site has been confirmed as land duly leased for a private sector activity for 25 years from the families.</p> |

| | | |
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| <p>4.</p> | <p><u>The National Water and Sanitation Policy, 2010</u></p> <p>The National Water and Sanitation Policy aims to:</p> <p>Improve the financing, management, and delivery of sustainable water services; and enable communities to adopt safe hygiene and sanitation practices and consume safe water. The Policy has five key themes that include:</p> <p>(i) Water Resources Management including equal access and use of water resources, effective water resource use; promotion of water management and quality and sustainable procedures and plans for the resource development;</p> <p>(ii) Urban Water Supply and Sewerage that aims to improve urban water supply coverage to 74% by 2015, improve sanitation coverage, prevent wasteful water use, improve participation, capacity and accountability</p> <p>(iii) Rural Water Supply – to improve health and alleviate poverty of the rural population through improved access safe water, community participation, investment and other activities (iv) Hygiene and Sanitation – to improve the health of communities and ensure that the majority of the population (66%) has access to sanitation services by 2015</p> <p>(v) Institutional, Legal and Regulatory Framework to ensure sustainable water resources management.</p> | <p>The project ESMP provides for the prevention of pollution and management of waste onsite.</p> <p>In addition, in order to promote water management quality and improve health and access to safe drinking water as provided in the policy, the management of Pee Cee Agriculture will dig water wells for the host communities as Community Development Action Plan (CDAP).</p> <p>Water quality test has been conducted to know the current status of the stream water.</p> |
|-----------|--|---|

| No. | Policies and Plans | Applicability to Proposed Project |
|-----|--|---|
| 5. | <p><u>National Biodiversity Strategic Action Plan 2017-2026</u></p> <p>This policy has been developed based on national needs and priorities for the implementation of the Convention on Biological Diversity (CBD). Therefore, the Sierra Leone Biodiversity Strategic Action Plan incorporate a series of measures and mechanisms intended to conserve and promote the sustainable use of the different components of the country’s biodiversity. The actions proposed to cover several key thematic areas under terrestrial biodiversity, inland water ecosystems, forest biodiversity, marine and coastal biodiversity, and agricultural biodiversity. This Action Plan is intended to provide a framework for setting priority policies and actions for the conservation and sustainable use of biological diversity in Sierra Leone; facilitate information sharing and coordinated action among the various stakeholders at the national level and foster scientific and technical cooperation with other countries and international organization.</p> <p>Further to this, the Strategic Action Plan provided for the development of monitoring and evaluation plan so the successes and challenges of the implementation of the process will be tracked.</p> | <p>The project will as much as possible avoid or minimize adverse biodiversity impacts e.g. trees will be planted to offset the effect of vegetation clearance for the purpose onions cultivation</p> |

| | | |
|-----------|---|--|
| <p>6.</p> | <p><u>The National Action Plan on Gender Based Violence, 2012 – 2016</u> The Ministry of Social Welfare, Gender and Children’s Affairs published the Sierra Leone National Action Plan on Gender Based Violence, a 5-year strategic planning document covering the period 2012 – 2016. This National Action Plan served as a guiding framework for the prevention, response and prosecution of acts of sexual and Gender Base Violence (SGBV) and served as a guide to service providers and implementing bodies, including government ministries, NGOs and civil society organizations, on how to provide coordinated, effective and sustainable protection and services to victims/survivors of SGBV.</p> | <p>The implementation of the project through full scale farming activities will attract the influx of workers and this has the potential to increase the risk of Gender Base Violence issues in the communities. These issues have been addressed by the mitigation measures proposed in this report and grievance redress mechanism.</p> |
| <p>7.</p> | <p><u>The Sierra Leone National Action Plan 2016 – 2018</u> The Sierra Leone National Action Plan on UN Resolution 1320 and 1825 aims to protect, empower women and girls vulnerable to sexual violence, preventing sexual violence through the enactment and implementation of laws and above all ensure the active participation and representation of women in leadership positions. The Sierra Leone National Action Plan also promotes coordination of the implementation of the document itself.</p> | <p>The implementation of the project through full scale farming activities will attract the influx of workers and this has the potential to increase the risk of Sexual and Gender Base Violence issues in the communities. These issues have been addressed by the mitigation measures proposed in this report and grievance redress mechanism.</p> |

4.2 National Regulatory Framework

The regulatory areas reviewed and applied in the assessment in compliance with national requirements include:

- The Constitution of Sierra Leone, 1991 Environmental Protection Agency Act, 2008 and the EPA (Amendment) Act, 2010
- Environmental Protection Agency (Environmental Impact Assessment License) Regulations 2010
- National Protected Area Authority and Conservation Trust Fund Act, 2012
- The Forestry Act, 1988
- Forestry Regulations, 1990
- Wildlife Conservation Amendment Act, 1990
- National Disaster Management Agency Act, 2020
- The Road Transport Authority Act (1996) (Amended to the Roads Safety Authority Act, 2016)
- Employers and Employed Act, 1960
- Factories Act, 1974

| No. | Legal Framework and Key Compliance Requirements | Applicability to Proposed Project |
|-----|--|---|
| 8. | <p><u>The Constitution of Sierra Leone, 1991</u> Chapter 3 of the Constitution which is the supreme law of the country recognize and protect the fundamental Human Rights and Freedoms of every individual. Section 15 therefore states that: "... every person in Sierra Leone is entitled to the fundamental human rights and freedoms of the individual." This includes enjoyment of property and protection from deprivation of property without compensation. Section 21(1) further stipulates that no property of any description shall be compulsorily taken possession of, and no interest in or right over property of any description shall be compulsorily acquired, except where land is required by the Government of Sierra Leone (GoSL) based on public interest.</p> | <p>In compliance with the chapter 3 sections 15 and 21 of the 1991, Pee Cee Agriculture project Makes provision for the compensation of persons whose property or livelihood will be affected by the project implementation. However, the propose project will be implemented on community in valley swamps (IVS) and the livelihood of the farmers will be affected.</p> |

| | | |
|----------|---|--|
| <p>9</p> | <p><u>Environmental Protection Agency Act, 2008 and the EPA (Amendment) Act, 2010</u></p> <p>This Act establishes the Environment Protection Agency— Sierra Leone (EPA- SL), and it defines its functions and powers, provides for its organization and administration, and provides rules for various matters regarding the environment in Sierra Leone. The Agency is established as a corporate body managed by the Board of Directors and an Executive Chairperson to provide for the effective protection of the environment and other related matters. It mandates the EPA among others to:</p> <ul style="list-style-type: none"> • Advise the Minister of Environment on the formulation of policies on all aspects of the environment; • Issue environmental permits and pollution abatement notices for controlling the volume, types, constituents and effects of waste discharges, • emissions, deposits or other sources of pollutants of substances which are hazardous and dangerous to the quality of the environment; • Prescribe standards and guidelines relating to ambient air, water and soil quality, air pollution, water, land and other forms of environmental • pollution including the discharge of waste and the control of toxic substances; • Ensure compliance with any environmental impact assessment procedures laid down in the planning and execution of development projects; and • Impose and collect environmental protection levies. <p>Part IV of the Act exclusively deals with the activities requiring Environmental and Social Impact Assessment and describes the permitting processes leading to the acquisition of an environmental license.</p> | <p>This Act provides guidance on the EIA process (registration, screening and assessment of the project impacts). Therefore, this ESIA report is guided by this Act which is why its review is very important.</p> |
|----------|---|--|

| | | |
|------------|---|--|
| <p>10.</p> | <p><u>Environmental Protection Agency (Environmental Impact Assessment License) Regulations 2010</u></p> <p>The Environmental Protection Agency Regulations 2010 supported the Environmental Protection Agency (EPA) Act 2008, detailing how the application for EIA license is undertaken. The regulations further provided the requirements to mitigate, monitor and manage the impacts identified in the assessment. In addition, the regulations stipulate the structure and contents of the ESIA report and provided the parameters/ point based Criteria for determination of Licenses Fees. Point based criteria use to determine licenses fees include:</p> <ul style="list-style-type: none"> • The project's capital outlay or investment; • The project's location relative to human settlements; • The total land area to be covered by the project; • The nature of project activities; • The impact of the project's activities on the environment; and • The level of environmental pollution engendered by the project activities. | <p>This Act provides guidance on the EIA process (registration, screening and assessment of the project impacts). Therefore, this ESIA report is guided by this Act which is why its review is very important.</p> <p>Provides guidance on registration, screening and assessment of the project impacts. Therefore, this ESIA report is guided by this regulations.</p> |
| <p>11.</p> | <p><u>National Protected Area Authority and Conservation Trust Fund Act, 2012</u> This Act provides for the establishment of the National Protected Area Authority (NPAA) and Conservation Trust Fund. The purpose of the Act is to promote biodiversity conservation, wildlife management, research and to provide for the sale of ecosystems services in national protected areas. Part III of the Act states the role of the NPAA is to provide oversight and authority over National Parks and Protected Areas designated for conservation purposes and to promote sustainable land-use practices and sustainable environmental management. Furthermore, section III (f) states that another function of the NPAA is to collaborate with other stakeholders in developing a national REDD+ Strategy and to promote REDD+ projects in Sierra Leone as a sustainable source of financing for protected area management. Section III (xi) promotes co-management of</p> | <p>Project development will impact of the upland and inland valley swamps ecology.</p> <p>Swamps in the project concession falls with the NPAA protected area.</p> <p>NPAA in its program to sustainable land use practices and sustainable environmental management can provide offset for the project. This is done in proponent consultation and agreement with the Agency terms and conditions.</p> <p>Proposed mitigations shall be addressed in the project ESMP</p> |

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| | <p>natural resources for the NPAA within and outside national protected areas with local forest edge communities.</p> | |
| <p>12.</p> | <p><u>The Forestry Act, 1988</u> This Act is identified to be integral to the Sustainable Tourism Development Project activities because the activities would impact the forest and the Act preserves the forest environment, promoting the practice of forestry in all use of forestland, to ensure sustainability of forest products, and the protection of the soil and water resources that constitute the environment. Removal of a national or community forest by whatever means, without legal permission, is prohibited by the Act.</p> | <p>Palm trees and other vegetation will be impacted from the clearance of the land as part of site preparation.</p> |
| <p>13.</p> | <p><u>Wildlife Conservation Amendment Act, 1990</u> The Wildlife Conservation Act provides for the protection of wildlife and conservation management and includes the establishment and operation of National Parks. Relevant requirements to this project are included below:</p> <ul style="list-style-type: none"> • Activities within the National Protected Areas that would disturb or injure the flora and fauna or cause destruction or damage to the habitat is forbidden; • Section 20, concerning the prohibition of cutting trees applies to the period between publishing the intention to create a NP and its creation. | <p>Some common wildlife and reptiles will be impacted but biodiversity impacts from clearance of some vegetation as part of project development are addressed by the ESMP. The project area involves the study for chimpanzee existence, the relevant conservation institution has been contacted for support.</p> |

| No. | Legal Framework and Key Compliance Requirements | Applicability to Proposed Project |
|------|--|--|
| 14.. | <p><u>National Disaster Management Agency Act, 2020</u></p> <p>This Act provides for the National Disaster Management Agency to; manage disasters and similar emergencies throughout Sierra Leone. This Act further provided the establishment of the following:</p> <ul style="list-style-type: none"> • Offices of the Agency throughout Sierra Leone, • National, regional, district and chiefdom disaster management committees, • National Disaster Management Fund to provide finances for the prevention and management of disasters and similar emergencies throughout Sierra Leone and to provide for other related matters. | <p>The project area exist within an ecotone and flood plain disaster and risks assessment studies is required and the relevant agencies will be engaged for support.</p> |
| 15. | <p><u>National Water Resources Management Agency Act 2017</u></p> <p>This Act provides for the equitable, beneficial, efficient, and sustainable use and management of the country’s water resources; to establish a National Water Resources Management Agency; to provide a Water Basin Management Board and Water Catchment Area Management Committees for the management of the water resources and other related matters. The Act makes provisions for how the Project is required to abstract water from the water resource points. Specifically, Part II, Section 2 prohibits the unlicensed use of raw water, while Part VII, Sections 28 and 29 outlines the procedure for a water use permit acquisition.</p> | <p>During the time project will be implemented, drip irrigation will be used and this activity could impact water bodies through sediment transport to nearby water bodies. This is addressed by the EMP</p> |

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| <p>16.</p> | <p><u>The Road Transport Authority Act (1996) (Amended to the Roads Safety Authority Act, 2016)</u></p> <p>This is an Act to provide for the establishment of an authority for the regulation and development of the road transport industry, including the registration and licensing of vehicles, the licensing of drivers, the prescription of routes for passenger and goods transportation and for other related matters.</p> <p>The objectives for which the Authority is established is regulate, coordinate and promote efficiency in all activities within the road transport sector, with a view to enhancing or improving the contribution of the sector to the economic development of Sierra Leone:</p> <p>Responsibilities of the Authority include the following:</p> <ul style="list-style-type: none"> • to design and regulate rules and regulations regarding: <ul style="list-style-type: none"> – registration and licensing of vehicles – testing vehicle and driver fitness – licensing of drivers – the routing and monitoring of passenger and goods transportation • to promote road safety through: <ul style="list-style-type: none"> – the establishment and dissemination of a code of conduct, to be known as a Highway Code for drivers and other users of roads and highways – to establish and maintain a data bank of relevant information on vehicles and the transportation industry as a whole <p>The Authority has the power to impose and levy fines including vehicle licensing and registration fees with the approval of parliament.</p> | <p>The project implementation will come with some traffic impacts and the relevant road safety institutions must be engaged to ensure the safety of persons and property.</p> <p>In addition, new vehicles will be purchased and more drivers will need to support the transportation of project personnel’s, tools, equipment’s, and produce. Therefore, outlining the provisions of the Act to the proponent will allow them do the right thing in recruiting competent drivers and monitor the speed a vehicle is expected to move.</p> |
|------------|--|--|

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| <p>17.</p> | <p><u>Employers and Employed Act 1960</u> The Act regulates relations between employers and employed, and safeguards the health of the employee. It sets forth provisions relating to the formation and interpretation of contracts of service, the recruitment of native labour for foreign services, restrictions on the engagement of industrial workers, employment of women, adolescents, and children apprenticeship contracts. It also regulates the death, insolvency, and change of residence of the employer, breaches of contract and disputes between the employer and employed, provisions as to agents, advances by employers.</p> | <p>The development of the project's human resource and recruitment policies and plans will be guided by this national employment legislation</p> |
| <p>18.</p> | <p><u>Factories Act</u> This Act deals with health and safety measures as they concern the factory worker. It protects the worker through demands for all aspect of cleanliness, reports of all injuries, accidents, diseases and death. It makes provision of inspection of facilities, prescribes the powers of an inspector and sets penalties for defaulting parties</p> | <p>Occupational health and safety issues will be raised especially during implementation and plans and guidelines will be guided by this Act.</p> |

| No. | Legal Framework and Key Compliance Requirements | Applicability to Proposed Project |
|-----|--|--|
| 19. | <p><u>Sierra Leone Local Content Agency Act, 2016</u> Establishes the Sierra Leone Local Content Agency to provide for the development of Sierra Leone local content in a range of sectors of the economy such as industrial, manufacturing, mining, petroleum, marine resources, agriculture, transportation, maritime, aviation, hotel and tourism, procurement of goods and services; public works, construction and energy sectors; to promote the ownership and control of productive sectors in the economy by citizens of Sierra Leone; and to provide for other related matters.</p> | <p>The project implementation will see locals being employed as well as some SMEs supplying the necessary goods and services.</p> |
| 20 | <p><u>Sierra Leone Small and Medium Enterprises Development Agency Act, 2016</u> Being an Act to provide for the establishment of the Small and Medium Enterprises Development Agency, to create a conducive environment within which Small and Medium Enterprises can thrive and operate, to provide for Sierra Leone's fiscal, monetary and banking policy, trade and industry, technology, marketing, infrastructural and institutional development, and for other related matters.</p> | <p>The objective of the project is to ensure economic development. SMEDA will be instrumental in providing access to affordable finance for SMEs in the commercial activities with direct bearing to the project activities.</p> |
| 21. | <p><u>Public Private Partnership Act, 2014</u> Being an Act to promote, facilitate and streamline conclusion and implementation of public private partnership (PPP) agreements by a contracting authority; to establish a Public Private Partnership Unit; to establish private partner selection procedures in PPP Agreements; and to provide for matters incidental thereto. Amends the National Public Procurement Act, 2004.</p> | <p>At the operations phase, facilities will be managed using a PPP arrangement</p> |

| | | |
|-----|---|--|
| 22. | <p><u>The Finance Act, 2016</u> Provides for the imposition and alteration of taxes, to give effect to the financial proposals of the Government and to provide for other related matters for the financial year</p> | <p>Operations of facilities will comply with state requirements including tax payment as required by the Finance Act</p> |
|-----|---|--|

4.3 Local Governance and Planning Requirements

The relevant legislation reviewed include:

- Local Government (Amendment) Act, 2017;
- The Local Government Act, 2004

| No. | Legal Framework and Key Compliance Requirements | Applicability to Proposed Project |
|-----|---|--|
| 23. | <p><u>The Local Government Act, 2004 (Amendment) Act, 2017</u></p> <p>This Act deals with the establishment and operation of local councils across the country to enable meaningful decentralization and devolution of Government functions. It stipulates that a local council shall be the highest political authority in the locality and shall have legislative and executive powers to be exercised in accordance with this Act or any other enactment. It shall be responsible, generally for promoting the development of the locality and the welfare of the people in the locality with the resources at its disposal and with such resources and capacity as it can mobilize from the central government and its agencies, national and international organizations, and the private sector. The local council should initiate and maintain programs for the development of basic infrastructure and provide works and services in the locality. A local council shall cause to be prepared a development plan which shall guide the development of the locality.</p> <p>Many projects are bound to operate within areas controlled by one local council or another. There is also a relationship between the local council and the Chiefdom within which a project operates. Therefore, every project is required to involve local councils in their development work. The schedules to the Local Government Act outline the activities of various MDAs that have been devolved to local councils</p> | <p>Local governance structures will be useful in project implementation activities such as planning, grievance redress, provision of security etc.</p> |

4.4 Public Health, Safety, Security and Social Protection

The reviewed legislation on public health, safety security and social protection includes:

- Public Health Amendment Act, 2014
- Sierra Leone Health Service Commission Act, 2011
- Persons with Disability Act, 2011
- National HIV and AIDS Commission Act, 2011
- National Security and Central Intelligence Act, 2002
- Sexual Offences Act, 2012
- The Domestic Violence Act, 2007

| No. | Legal Framework and Key Compliance Requirements | Applicability to Proposed Project |
|-----|---|---|
| 24. | <p><u>Public Health Amendment Act, 2014</u> This Act provides with respect to matters of public health in Sierra Leone, including, among other things, water supply, drainage, water pollution, sanitation, hygiene and wholesomeness of food, the control of animals, and nuisances. The Act prohibits the sale of food intended for, but unfit, for human consumption and provides with respect to food inspection.</p> | <p>Application of agro-chemicals on the farming could have impacts on public health especially when the chemicals will be leached during the raining season into the nearby water bodies which serves as source of water for the community and breeding ground for some marine creatures. This is addressed in the ESMP</p> |
| 25. | <p><u>Sierra Leone Health Service Commission Act, 2011</u> This is an Act to provide for the establishment of the Sierra Leone Health Service Commission to assist the Ministry responsible for health in the delivery of affordable, accessible and improved healthcare services to the people of Sierra Leone</p> | <p>The project will rely on available health facilities for its staff to access healthcare services when necessary.</p> |
| 26. | <p><u>Persons with Disability Act, 2011</u> Being an Act that established the National Commission for persons with disability, it seeks to prohibit discrimination against persons with disability and ensure the maximization of equal opportunities for persons with disability and to provide for other related matters.</p> | <p>Project human resource and recruitment policies will make provisions that will prohibit discrimination against persons with disability</p> |

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| <p>27.</p> | <p><u>National HIV and AIDS Commission Act, 2011</u> Being an Act to establish the National HIV and AIDS Commission to be making policies for the prevention, management and control of HIV and AIDS, to provide for the treatment, counselling, support and care of persons infected with, affected by or at risk of HIV and AIDS and for other related matters.</p> | <p>Presence of some migrant workers and tourists (at the operation phase) has implications for the spread of sexually transmitted infection/diseases including HIV/AIDS</p> |
| <p>28.</p> | <p><u>National Security and Central Intelligence Act, 2002</u> The Act, provides for the internal and external security of Sierra Leone, and for other related matters.</p> | <p>National security and intelligence officer will be employed to guide and provide security arrangement during project implementation to prevent crimes and conflicts</p> |
| <p>29.</p> | <p><u>Sexual Offences Act, 2012 and Amended Act 2019</u> The Act, inter alia, increases the minimum jail sentence for sexual violations from two years to between five and fifteen years. It defines consent as an agreement by choice with the person having both the freedom and the capacity to make that choice. The act further provided that persons under the age of 18 years are not capable of giving consent under the Act. Marriage can also not be used as a defense against violations of the Act, especially forced sex in marital relationships. The Act protects children, especially girls, from being abused by people in position of trust (teachers, as well as traditional and religious leaders). The 2019 Amended Act increases the jail sentence from 15 years to life imprisonment for young and adults involving in rape/ sexual penetration</p> | <p>Workers will be given contracts that have Codes of Conduct that prohibits sexual harassment and other SGBV.</p> |
| <p>30.</p> | <p><u>The Domestic Violence Act, 2007</u> This act criminalizes domestic violence, addressing issues of sexual, physical, emotional, psychological and economic violence perpetrated against an individual in a domestic setting. The issues covered under the act are commonly committed against women and children, which were lawful if reasonable before the enactment of the law.</p> | <p>Locals, workers and tourists will be sensitized on domestic violence and the penalties associated for involving in such acts.</p> |

4.5 International Financial Corporation (IFC) Performance Standards.

The International Financial Corporation Performance Standards are directed towards clients to guide the safe development of projects it is funding., providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation. The requirements are not inconsistent with the national requirements and therefore no implementation conflicts are foreseen. The triggered standards are described in the Table below.

PS1 is triggered because Pee Cee Agriculture project is a large scale agricultural project that may have some environmental and social impacts during the implementation phase of the project. These risks will however be managed throughout the implementation mitigation measures as prescribed in the ESHIA Report.

PS 2 Project implementation activities such as farming operation and facility management could result in generation of solid and liquid wastes and gaseous emissions as pollutants. The application of agrochemicals on the soil and generation of liquid wastes may cause leaching and this may contaminate both surface and underground water. However, these possible impacts will be adequately addressed by the mitigation measures proposed in Occupational Health and Safety section of this ESIA Report.

PS3 and 4. The Contractor, operator and other employees of the Pee Cee Agriculture project shall comply with the Labour laws and Occupational Health and Safety Best Practice.





Since the project will employ different sets of people, it is very likely for workers to involve in worksite accidents, and spread diseases among themselves.

PS5. The Pee Cee Agriculture project require land acquisition especially lands that were previously occupied by local farmers. The local farmers have been displaced from their farm land and this call for compensation package either to find another land for them to continue their farming activities of give sum amount of money to start doing businesses.





PS 6. The proposed project will involve extraction of large volume of ground water resources i.e. water for irrigation and other domestic uses this form part of its operations. Also, there will be vegetation clearing, displacement of fauna, and compaction of soil and Photoperiodism of plants at the project site. However, these will be addressed by mitigation measures proposed in this ESIA report.

PS 8. The proposed project leased concession falls within the scared grooves of the Rogbatha and Rogberek communities respectively. Community opinion leaders are willing to relocate if proponents agree to their terms.

Table 4: International Financial Corporation (IFC) Performance Standards.

| No | Performance Standards | Summary of core requirements | Potential for Trigger |
|---|--|---|-----------------------|
| PS 1  | <i>Assessment and Management of Environmental and Social Risks and Impacts</i> | <ul style="list-style-type: none"> Identify and evaluate environmental and social risks and impacts Anticipate, avoid, minimise and or compensate PAPs Establish effective ESMS, for stakeholders/community participation and grievance redress mechanisms. | Triggered |
| PS 2  | <i>Labour and Working Conditions of workers</i> | <ul style="list-style-type: none"> Ensure workers safety Promote the fair treatment, non-discriminatory and equal opportunity of workers Establish, maintain and improve the worker-management relationship Comply with national employment and labour laws of host country. | Triggered |
| PS 3  | <i>Resource Efficiency and Pollution Prevention</i> | <ul style="list-style-type: none"> Use efficient pollution abatement machinery to reduce pollution. Avoid or minimise adverse impacts on human health and the environment Promote sustainable use of resources such as energy and water. | Triggered |
| PS 4  | <i>Community Health, Safety and Security</i> | <ul style="list-style-type: none"> Evaluate the risks and impacts to the health and safety of the Affected Communities during the project lifecycle Establish preventive and control measures consistent with Best International Practices and commensurate with their nature and magnitude of impacts. | Triggered |

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| <p>PS 5</p>  | <p><i>Land Acquisition and Involuntary Resettlement</i></p> | <ul style="list-style-type: none"> • Project siting and activities should not displace people. • Otherwise, displacement should be minimised by alternative project design considerations. • No force eviction should be undertaken • Compensate and ensure a humane resettlement procedure, disclosure of information, consultation and participation of PAPs • Ensure the physical and economic wellbeing of displaced people are not worse of than their pre displaced lives. | <p>Triggered</p> |
| <p>PS 6</p>  | <p><i>Biodiversity Conservation and Sustainable Management of Living Natural Resources</i></p> | <ul style="list-style-type: none"> • Identify potential threats to biodiversity and ecosystem services. • Indicators include habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, and pollution. | <p>Triggered</p> |
| <p>PS 7</p>  | <p><i>Indigenous People</i></p> | <ul style="list-style-type: none"> • Identify Indigenous Peoples and communities in project area • Establish nature and degree of the expected direct and indirect economic, social, cultural (including cultural heritage), and environmental impacts on them. • Avoid adverse impacts on Affected Communities of Indigenous Peoples | <p>Not triggered</p> |
| <p>PS 8</p>  | <p><i>Preservation of Cultural Heritage</i></p> | <ul style="list-style-type: none"> • Protect cultural heritage from the adverse impacts of project activities and support its preservation. • Promote the equitable sharing of benefits from the use of cultural heritage. | <p>Triggered</p> |

5.0 BASELINE ENVIRONMENTAL SETTING OF THE PROJECT SITE

A baseline information of the biophysical and social environment of the project area was collected, through field surveys, available data from literature and local knowledge. Baseline conditions give the existing status of the environment in the area before the commencement of the proposed project, however, this baseline was partially collected before the commencement of the pilot phase and during the pilot phase within a time interval of seven months which would not actually serve the purpose of a base reference against which the changes, due to the implementation of the project are measured. The details below present the captured biophysical and social conditions of the project area.

However, the data have been analysed from Environmental Monitoring Surveys (viz. air, soil, noise and water) conducted at selected locations. Table below gives various environmental attributes considered for formulating the environmental baseline and the frequency and monitoring methodology for various environmental attributes.

Table 5 : Various Environmental Attributes

| No. | Attribute | Parameter | Source of Data |
|-----|------------------------|--|---|
| 1 | Land Use | Trend of land use change for different categories | Secondary data sources: Freetown City Council |
| 2 | Water Quality | Physical, Chemical and Biological parameters | Grab samples are collected for a season study from 5 locations |
| 3 | Ambient Air Quality | SPM, SO ₂ , and NO _x , | Ambient air quality monitoring at 4 locations and nearest residents |
| 4 | Noise Levels | Noise levels in dB (A) | Noise level monitoring at 4 locations and nearest residents |
| 5 | Ecology | Existing terrestrial flora and fauna within the project site | Samples collected from site and identified through expert judgement and secondary |
| 6 | Geology | Geological history | Primary/Secondary sources: Mines and Geology agencies |
| 7 | Socio-economic Aspects | Socio-economic characteristics of the affected area | Based on field survey and data collected from secondary sources |

5.1 Physical Environment

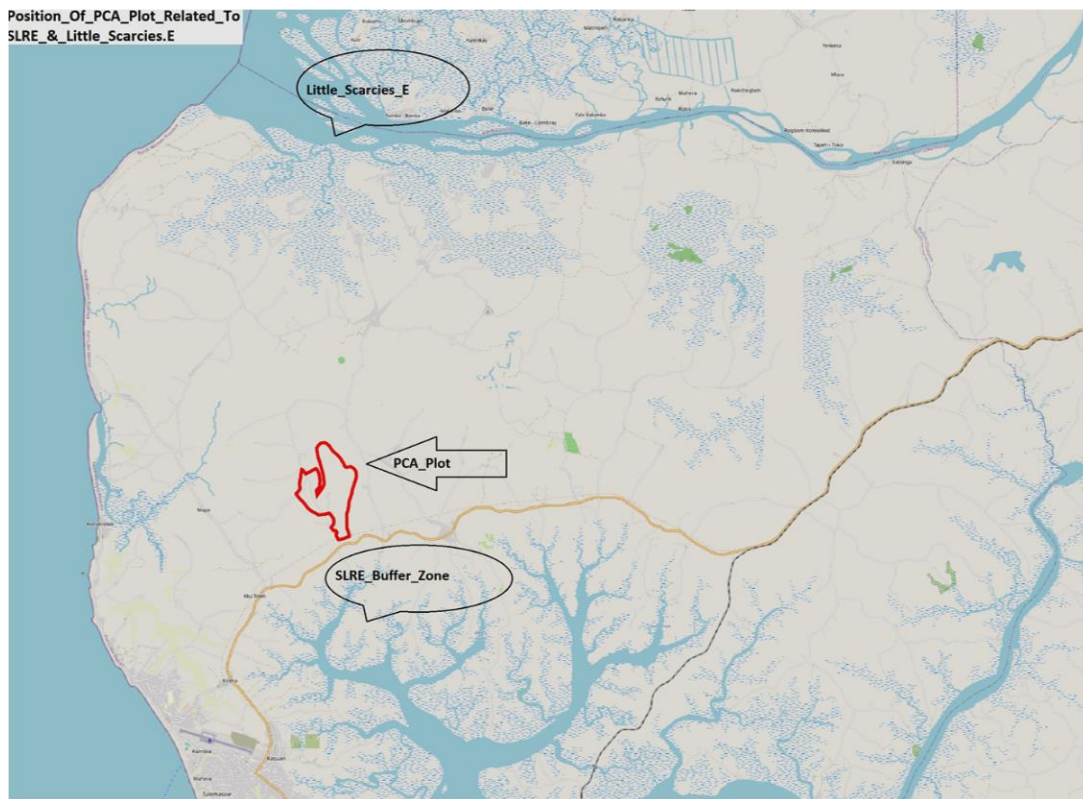
5.1.1 Project Location

The project concession is positioned in the Lokomasama wetlands. The Lokomasama wetland which is a wetland of conservation concern, situated between the Sierra Leone River Estuary (SLRE) and the Little Scarcies River Estuary. The project entire area lies outside the buffer zone of the Sierra Leone River Estuary and over 20 miles away from Barbara, Gbinti and Bailor which are the closest communities to the little scarcies river estuary north of the project concession. As in plate 3 below.

The PCA project concession is accessible from the Lungi Port Loko highway. The concession commenced in less than 2 kilometres from the main Sierra Leone River Estuary. The main access road transverses the communities of Mathen, Forikolo and Rogbatha on one end and a separate road to Rogberek along the Port Loko –Komrabai highway.

Some vital infrastructures and facilities exists close to the access road and within the project leased concession such as schools (Mathen and Forikolo), main source of ground water (water well) whiles the main health facilities serving the entire communities is located in Mathen within the concession leased area. The presence of PCA project development is of safety concern for pupils, health care workers and patience's as well as locals that ply the road and domestic animal population.

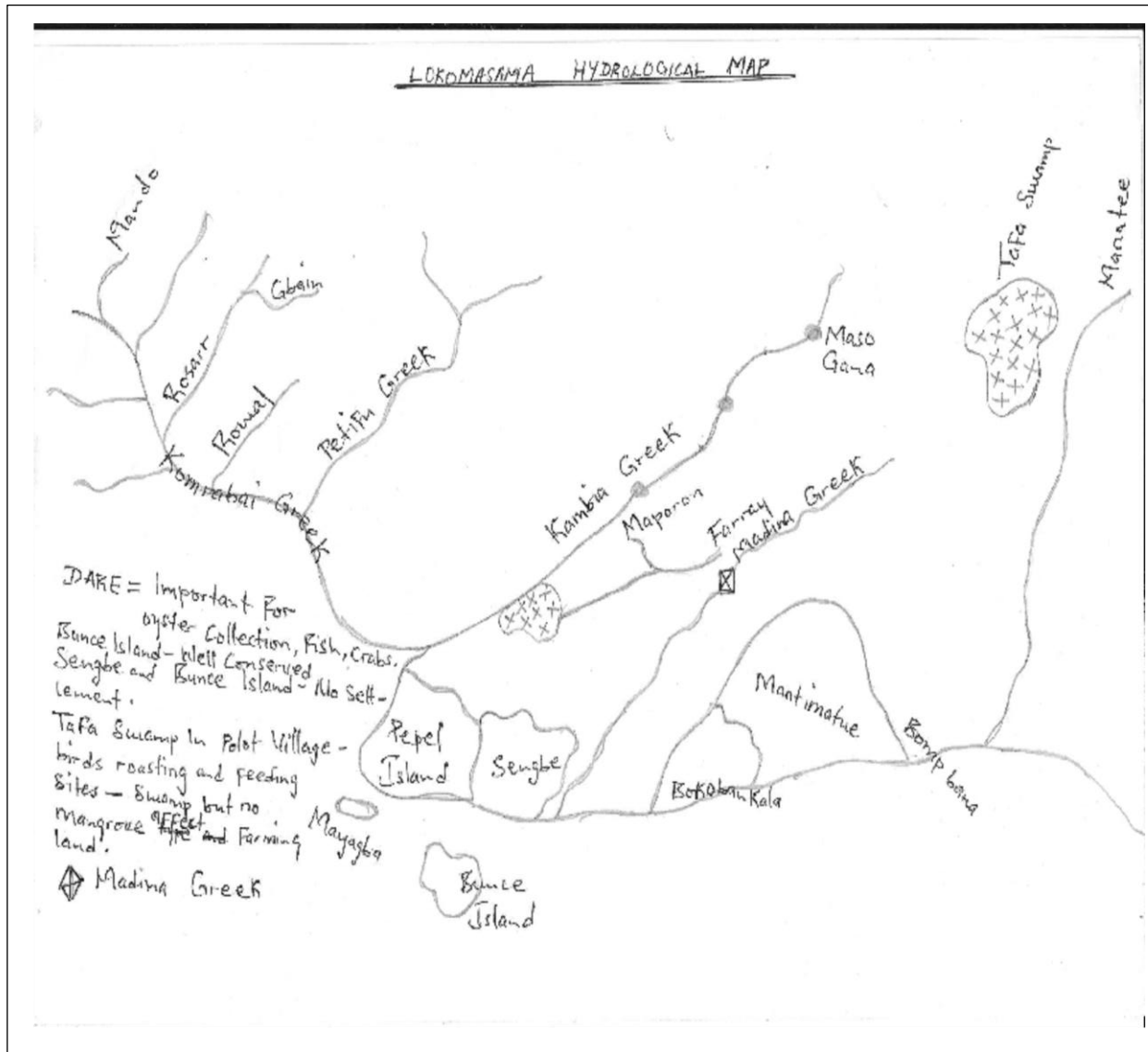
Plate 4: Project location map



5.1.2 The Lokomasama Wetlands

It is considered finger tributaries of the SLRE at Foronkolo and Rogbetha, viewed as an associated underground water that enters the little scarcies. The Port Loko creek submerges at the highland of komrabai and empties at little scarcies. The topography and hydrological regimes of komrabai makes it a breeding ground for wildlife's and nesting site for migratory birds.

Plate 5: Sketch of Lokomasama hydrological Map (Source: SLRE PRA Report Final)



5.1.3 Brief Profile of SLRE

SLRE is an estuary of four major rivers that includes Rokel, Bounce, Port Loko and Mamanty River. Along those major rivers are many creeks, and tributaries of the rivers entangled in the deltaic system of SLRE as shown by Maforkie and Lokomassama hydrological maps. SLRE has a wide open sea with at least 29 Islands among which 18 remain wild. Source: SLRE PRA Report Final.

The estuary is being threatened by a growing population. For example, unauthorised housing development has caused the removal of about 20 hectares of mangrove vegetation over the past five years alone. Poor waste disposal, unsustainable fishing and many other factors are also taking their toll on the ecosystem. Some 295 000 hectares of this estuary is protected under the Ramsar Convention – an intergovernmental treaty for the sustainable use of wetlands. -Source

https://www.esa.int/ESA_Multimedia/Images/2016/01/Sierra_Leone_River_Estuary

Plate 6: Satellite Image of SLRE and Location of PCA Project site

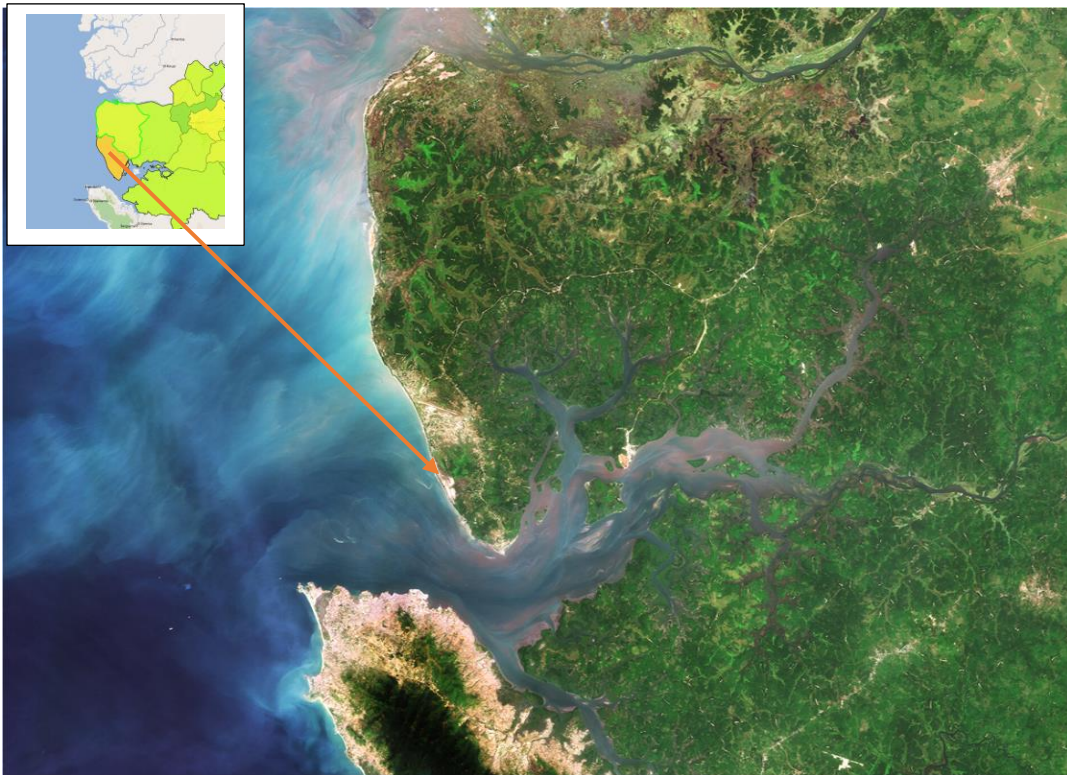
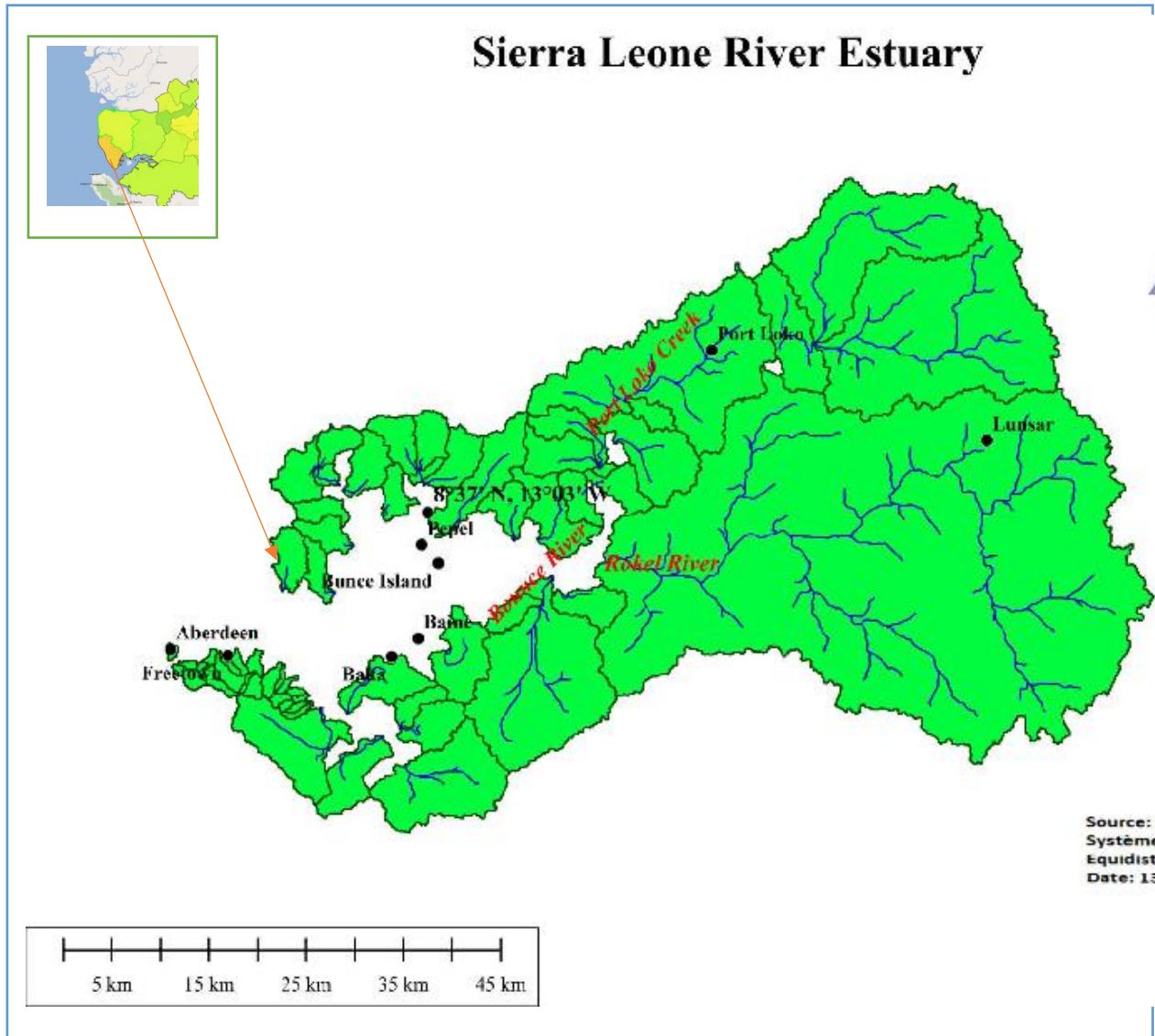


Plate 6: Map of Sierra Leone River Estuary (SLRE) Boundary delineation



Source: SLRE PRA Report Final

5.2 Climate

Rainfall

Generally, Sierra Leone has a tropical climate with two pronounced seasons: a rainy season from May to November, and a dry season from December to April. Rainfall is highest in the coastal areas and decreases inland and at the eastern border of the country. Climate in Sierra Leone is determined mainly by the seasonal movements of two air masses: the north-easterly Continental Tropical Winds (commonly called North-east Trade Winds) and the south-westerly Maritime Tropical Winds (commonly called South-West.

In Port Loko, the wet season is overcast, the dry season is partly cloudy, and it is hot and oppressive year round. Over the course of the year, the temperature typically varies from 70°F to 91°F and is rarely below 63°F or above 95°F. Source: Climate and Average Weather Year Round in Port Loko Sierra Leone

Specifically, the PCA project district has a tropical, humid climate with two distinct seasons – the wet season from May to October and the dry season from November to April. From December to April over the dry spell, the dry Harmattan winds blow from the Sahara.

Months with the largest precipitation are July, August, September with 2971 mm precipitation. Most precipitation occurs in July with an average precipitation 1245 mm. The annual amount of precipitation in Port Loko is 4203 mm. *Source: Climograph of monthly averages climate data - temperature and precipitation in Port Loko.*

Justifiable Rainfall records of the chiefdom and lungi are limited. The country experience early rain, which is impacting the length of the raining season and growing season. Time series data analysis of 1981-2018 records of changes of rainfall in Sierra Leone, reveals that there is a reduction in the rainfall in the northwest of the country. As witnessed from December 2022 to March 2023, few showers were observed, indicating evidence that the raining season is becoming erratic, this circumstance has the potential for temperature increase and critical conditions for farmers.

Temperature

The average annual temperature is 30°C in Port Loko. The warmest month of the year is January, with an average temperature: 31°C. Usually August is the coldest month in Port Loko, with average temperature 27°C. The difference between the hottest month: January and the coldest month: August is: 4°C. The difference between the highest precipitation (July) and the lowest precipitation (January) is 1242mm. *Source: Climograph of monthly averages climate data - temperature and precipitation in Port Loko.*

Table 7: Climate Data for Port Loko

| | Janua ry | Februa ry | Marc h | Apri l | Ma y | Jun e | July | Augu st | Septem ber | Octob er | Novem ber | Decemb er |
|--|------------------------------|-------------------------------|----------------------------|----------------------------|--------------------------|---------------------------|----------------------|-----------------------------|--------------------------------|------------------------------|-------------------------------|-------------------------------|
| Port Loko - General climate index | very high (93) | very high (87) | very high (87) | very high (87) | very high (84) | very high (84) | very high (85) | very high (85) | very high (81) | very high (84) | very high (81) | very high (93) |
| Port Loko - Daytime temperature (average) | 31°C / 87°F | 31°C / 87°F | 30°C / 86°F | 31°C / 87°F | 31°C / 87°F | 30°C / 86°F | 29°C / 84°F | 28°C / 82°F | 29°C / 84°F | 30°C / 86°F | 31°C / 87°F | 31°C / 87°F |
| Port Loko - Night-time temperature (average) | 24°C / 75°F | 25°C / 77°F | 25°C / 77°F | 26°C / 78°F | 25°C / 77°F | 24°C / 75°F | 24°C / 75°F | 24°C / 75°F | 24°C / 75°F | 25°C / 77°F | 25°C / 77°F | 24°C / 75°F |
| Port Loko - Hail | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Port Loko - Rainy day | 3% | 0% | 2% | 5% | 32% | 44% | 70% | 76% | 52% | 29% | 14% | 1% |
| Port Loko - Foggy day | 9% | 2% | 0% | 0% | 0% | 1% | 1% | 1% | 0% | 2% | 3% | 6% |
| Port Loko - Windy day | 5% | 9% | 11% | 8% | 14% | 6% | 2% | 6% | 5% | 2% | 4% | 7% |
| Port Loko - Stormy day | 1% | 1% | 2% | 6% | 45% | 58% | 36% | 19% | 35% | 49% | 35% | 1% |

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| | <u>Janua</u> <u>ry</u> | <u>Februa</u> <u>ry</u> | <u>Marc</u> <u>h</u> | <u>Apri</u> <u>l</u> | <u>Ma</u> <u>y</u> | <u>Jun</u> <u>e</u> | <u>July</u> | <u>Augu</u> <u>st</u> | <u>Septem</u> <u>ber</u> | <u>Octob</u> <u>er</u> | <u>Novem</u> <u>ber</u> | <u>Decemb</u> <u>er</u> |
|---------------------------------------|---------------------------|----------------------------|-------------------------|-------------------------|-----------------------|------------------------|-------------|--------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|
| Port Loko - Sultry day | 89% | 98% | 98% | 99% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 88% |
| Port Loko - Tornado | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Port Loko - Cloudy day | 11% | 7% | 7% | 2% | 0% | 0% | 0% | 0% | 0% | 1% | 1% | 10% |
| Port Loko - Sunny and cloudy | 38% | 43% | 36% | 48% | 94% | 94% | 94% | 96% | 99% | 96% | 90% | 64% |
| Port Loko - Partly cloudy | 51% | 51% | 57% | 50% | 6% | 6% | 6% | 4% | 1% | 3% | 9% | 26% |
| Port Loko - Humid day | 98% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 99% |
| Port Loko - Rainfall | 3% | 0% | 2% | 5% | 32% | 44% | 70% | 76% | 52% | 29% | 14% | 1% |
| Port Loko - Dewpoint (high - average) | 20°C / 68°F | 22°C / 71°F | 22°C / 71°F | 22°C / 71°F | 23°C / 73°F | 23°C / 73°F | 23°C / 73°F | 23°C / 73°F | 24°C / 75°F | 23°C / 73°F | 24°C / 75°F | 20°C / 68°F |
| Port Loko - Dewpoint (low - average) | 19°C / 66°F | 21°C / 69°F | 21°C / 69°F | 21°C / 69°F | 22°C / 71°F | 22°C / 71°F | 22°C / 71°F | 22°C / 71°F | 23°C / 73°F | 22°C / 71°F | 23°C / 73°F | 19°C / 66°F |

5.2.1 Climate Change/ Climate Variability

Sierra Leone is experiencing changes in rainfall pattern, wind speed and temperature rise for over a decade. The degree of precipitation has resulted to flooding which has destroyed people habitats and damage to farm lands. Though flooding is been associated to climate change but there is no real evidence but according to (Coordinated Regional climate Downscaling Experiment), CORDEX: Unfortunately, predicting the effect of climate change on the West African Monsoon (WAM) is difficult. Locals in PCA project host community claims that, the streams and swamps loses water faster during the dry season than it was 8-10 years. Project developmental phase shall consider the above factors as a specialist study and incorporate the outcome of the analysis as part of its management tool and risks factors. From both quantitative and qualitative data analysis, there is a low degree of climatic variation throughout the district.

5.3 Topography and Relief

The topography of the PCA project concession is mostly undulated by community. The concession area rises gentle to sloppy forms. With some undulated features at Forikolo in the North to Rogbatha and Rogbereh in the North- east and Mathen down South-East of the project site. Specialist topographic study is required to be conducted as soon as possible as part of project technical feasibility report in order ascertain the potential adverse impacts of Sierra Leone climate /weather variability and other forms of natural hazards on the project land preparation and operational phase activities particularly on each of the host communities.

5.4 Geology and Soil

Most of Sierra Leone is underlain by Precambrian cratonic rocks of the Archaean Basement Complex (Lapworth et al. 2015). A major belt of late Precambrian (Upper Proterozoic) to Lower Palaeozoic age metasedimentary rocks, with some (Meta) volcanic rocks, occurs in the western part of the country (Camus and Cukor 2012, Lapworth et al. 2015). These are often capped by a weathered zone of unconsolidated material, where the Precambrian basement rocks have been weathered in-situ to sand, gravel and clay. They are also often capped by a layer of laterite or ferricrete.

There are outcrops of intrusive igneous rocks across the country, which are generally of granitic composition (Camus and Cukor 2012, Lapworth et al. 2015). Across the country, river valleys often contain infills of unconsolidated alluvial deposits, laid down by rivers. Along the coastal belt there are also extensive outcrops of coastal, marine and estuarine unconsolidated deposits.

The geology of Lokomasama belongs to the Bullom Group which is the youngest recognized stratigraphic group in the country, comprising onshore Cenozoic sediments deposited along the coastal margin. Comprising poorly consolidated, coarse quartzofeldspathic sands interbedded with seams of clay, clay-sand and lignite. Superficial geology includes river terraces and alluvium that are locally associated with artisanal diamond and gold mining, and a coastal belt comprising marine and estuarine sediments. SOURCE: Geological mapping of Sierra Leone: baseline assessment and next steps. BGS Global Open Report OR/18/004.

5.5 Land Use and land Use Change

About 80% of the entire PCA project leased area (Highland and lowlands) are an existing farm lands which has been exploited by the locals over the decades, the several forest regrowth are not cut down because locals depend on those as building poles, fuelwood and charcoal burning as their main source of energy. Due to the area's proximity to the inland valley swamp (IVS), dominant crops includes but not limited to Palm plantations (non-productive), small orchards, backyard gardens and subsistence farming indicating shifting cultivation and slash and burn practices signifying typical wood land and savannah grass land. The project development would not cause significant land use change.

Landscaping is expected to be undertaking for ridge/bed preparation for onion cultivation. This aspect has the potential to alter the natural drainages and prompt flooding to communities downstream of the project site during the raining season.

5.5.1 Ecology of the Project Site

Project concession is characterized as an Upland and Lowland as earlier stated. The Upland features typical farm bush and the Lowland is woodland savannah associated with fresh water inland valley swamp. The ecology of the environment can be best describe as a transition ecotone ecology meaning that it is associated wetland and dry land between the SLRE and the little scarcies estuary . The ecology is affected by flash flood that infiltrate marine water into the inland valley swamps, inducing salinity on the fresh water swamp due to sea level rise. Mainly during the raining season

5.5.2 Evapotranspiration

The climate environment of the study area was analysed and superimposed on some aspect of the farming process. It is obvious that the study area will be exposed to high temperature and high humidity during the dry spell. Increased wind speed as a result of removal of vast area of vegetation for land preparation and ancillary facilities as well as its location (Creek)

The potential for evapotranspiration is obvious. However, proposed PCA project land preparatory method (Mulches) reduce evaporation by restricting air movement, maintaining a high air vapor pressure near the soil surface, and shielding the soil from solar energy. In areas with growing plants, water passes into the atmosphere by evaporation from soil surfaces and by transpiration from plants.

Estimated evapotranspiration degree, is needed for determining irrigation requirements for crops as well as water storage in reservoirs. High evapotranspiration from such crops with fibrous roots may be beneficial for the removal of soil water.

5.6 Environmental Quality Monitoring

This section present the environmental quality monitoring conducted. The aim is to gathered important environmental quality data regarding Ambient Air, Noise Levels and Water Quality that will serve as a baseline condition at the PCA project pilot phase site and nearest community. It is expected that the data gathered shall be used to monitor the changes on the environmental, health and safety of the employees and the neighbouring environment during the operational phase of the PCA project.

5.6.1 Air Quality Monitoring and Methodology

With the obligation of the Air Quality assessment adapted by EPASL, it has become important to adopt a clean air policy as it relates to the land preparation, construction and operation of the PCA project development. For the purposes of this EIA, several parameters were examined as it relates to the air environment: meteorology, air quality, temperature and humidity.

The prime objective of collecting baseline air quality data is to assess the ambient air quality of the project influence area. Ambient air quality monitoring was carried out for a total of 24 hours during the month of February, 2023 at the following locations: (i) Mathen environs (ii) Rogbatha, (iii) Rogbereh (iv) Forikolo. Analytical results are presented in Table 9 below.

5.6.1.1 NO₂ and SO₂ Sampling

The A-S500 instrument consists of a monitor base and a sensor head of different gases. A Gas Sensitive Electrochemical (GSE) Sensor was used to determine the concentration levels of NO₂ and SO₂. The GSE sensors generate nano-amp currents proportional to the gas concentration which uses low noise electronics to capture these signals resulting in low detection levels.

A particular gas was measured, when sensor head of the gas was connected to the monitor base. Connection of the required sensors to the monitor was done prior to the turning on of the equipment before measurement. The monitor was switched on and allowed to warm up for 3 minutes to 'burn off' any contaminants trapped in the sensor prior to monitoring.

The ambient concentrations were recorded for every minute, from which hourly concentrations were calculated and mean concentrations determined. The particulate matter concentrations logged by the instrument were automatically saved in high-capacity internal flash memory built in the instrument. The results of the measurement were then transferred to a computer, where it was managed, and reports created using the A-S500 V6.5 software.

5.6.1.2 PM10 and PM2.5 Sampling

The sampling and analysis of ambient particulate matter concentrations was done according to the ASTM Test Method D4096-17. Particulate matter was sampled for 24 hours using ARA N-FRM Air Sampler set to a flow rate of 16.7 L/min drawing air through the inlet onto a 47mm quartz filter for analysis. The quartz filter paper was stabilized for a minimum of 24 hours before and after sampling in a desiccator.

The ARA N-FRM air sampler is equipped with a RTP profiler, which uses a Plan tower light-scattering sensor to provide real-time data for two size ranges approximating PM10 and PM2.5. It shows trends during the sample run, supplementing the filter data. The fresh quartz filter paper was weighed before and after the 24-hour sampling period, and the difference in weight (W2-W1) used to calculate the concentration of the particulate matter in $\mu\text{g}/\text{m}^3$.

5.6.1.3 Compliance Criteria Air Quality

Table 8: Compliance Criteria Air Quality

| No | Parameter | Maximum Limits | Average Time |
|----|--|----------------|--------------|
| 1 | Carbon Monoxide, $\mu\text{g}/\text{m}^3$ | 30 | 1 hour |
| | | 10 | 8 hours |
| 2 | Sulphur Dioxide (SO ₂), $\mu\text{g}/\text{m}^3$ | 500 | 1 hour |
| | | 125 | 24 hours |
| | | 50 | 1 year |
| 3 | Nitrogen Oxides (measured as NO ₂), | 200 | 1 hour |
| | | 40 | 1 year |
| 4 | Total Suspended Particulate, $\mu\text{g}/\text{m}^3$ | 150 | 24hours |
| | | 100 | 1 Year |
| 5 | PM ₁₀ , $\mu\text{g}/\text{m}^3$ | 50 | 24hours |
| | | 20 | 1 year |
| 6 | PM _{2.5} , $\mu\text{g}/\text{m}^3$ | 25 | 24hours |
| | | 8 | 1 year |

5.6.2 Mathen Air Quality Monitoring

The Particulate Matter (PM_{2.5} and PM₁₀) concentrations monitored at the project site were 12.42 µg/m³ and 18.61 µg/m³ for the nearest residence, concentrations were 8.62 µg/m³ and 10.21 µg/m³. Respectively were found to be within the Sierra Leone Standard (SLS 42:2014) permissible values of 25 and 50 (µg/m³),

The NO₂ concentrations ranged from (pilot phase site) area 60 to 120 nearest residence (µg/m³), SO₂ concentrations at the same monitoring location, ranged from 120 to 180 (µg/m³). The concentrations of NO₂ and SO₂ recorded at both monitoring locations were within the SLS of 200 and 500 (µg/m³) respectively.

The monitoring team did not observe much activity in the nearby communities that could have significant influence on the air quality at the time of the assessment.

5.6.3 Forikolo Air Quality Monitoring

The Particulate Matter (PM_{2.5} & PM₁₀) concentrations monitored between the Pilot phase facilities and Forikolo was 12.86µg/m³ and 25.60 µg/m³ to the nearest residence respectively were found to be within the Sierra Leone Standard (SLS 42:2014) permissible values of 25 and 50 (µg/m³),

The NO₂ concentrations monitored from the same location, ranged from 80 to 140 ,Nearest residence (µg/m³), SO₂ concentrations ranged from 160 to 210 (µg/m³). The concentrations of NO₂ and SO₂ recorded at both monitoring locations were within the SLS of 200 and 500 (µg/m³) respectively.

The monitoring team did not observe much activity in the nearby communities that could have significant influence on the air quality at the time of the assessment.

5.6.4 Rogbereh Air Quality Monitoring

The Particulate Matter (PM_{2.5} and PM₁₀) concentrations monitored at the (flood plain) were 8.0 µg/m³ and 21.31 µg/m³. For the nearest residence, concentrations were 3.41µg/m³ and 10.6 µg/m³. These are within the Sierra Leone Standard (SLS 42:2014) permissible values of 25 and 50 (µg/m³).

With same monitoring locations, the NO₂ concentrations ranged from 80 to 100 (µg/m³), SO₂ concentrations ranged from 100 to 120 (µg/m³). The concentrations of NO₂ and SO₂ recorded at both monitoring locations were within the SLS of 200 and 500 (µg/m³) respectively.

The monitoring team did not observe much activities in the communities that could have significant influence on the air quality at the time of the assessment.

5.6.5 Rogbatha Air Quality Monitoring

The Particulate Matter (PM_{2.5} & PM₁₀) concentrations monitored at Rogbatha (Pilot Project site) of 19.83 µg/m³ and 36.72 µg/m³ nearest residence respectively were found to be within the Sierra Leone Standard (SLS 42:2014) permissible values of 25 and 50 (µg/m³).

With same monitoring locations, the NO₂ concentrations ranged from 140 to 160 (µg/m³), SO₂ concentrations ranged from 340 to 160 (µg/m³). The concentrations of NO₂ and SO₂ recorded at both monitoring locations were within the SLS of 200 and 500 (µg/m³) respectively.

The monitoring team observed farm and construction phase preparation activities and vehicle movements within and along the community plot that could have significant influence on the air quality at the time of the assessment.

5.6.6 Conclusion Air Quality Monitoring

The Particulate Matter (PM_{2.5} & PM₁₀) concentrations monitored at all sites were within the SLS permissible values of 25 and 50 (µg/m³). The concentration of gases (NO₂ and SO₂) recorded for the monitoring period were all within the SLS guidelines. The monitoring team observed that there were some rain showers during the monitoring period which could influence the air quality at the time of the assessment.

5.7 Ambient Noise Monitoring and Methodology

Noise levels have been measured at four locations (same as those for air quality) to determine minimum, maximum and average levels.

The project is located in a predominantly rural area and therefore the residential noise standard for daytime and night-time will apply. The analysis shows that even without PCA project activities, the decibel readings are considerable to residential target value. This is due mainly to the croaking of frogs, cricket's birds and rustling of leaves and generation sound during the February 2023 monitoring.

Monitoring equipment

Noise measurements/recordings were taken with a High Precision TSI Quest Sound Level Meter, Model Type 1. In the month of August 2022 and repeated in February 2023. Data acquired for the February 2023 The sound level meter has an in-built calibrator, and was calibrated before each measurement/recordings were taken.

- The noise meter was calibrated at 114 dB (A) prior to the measurement. The following statistical indices was computed Lmax, Lmin, LAeq, L10, L50, L90
- The ambient noise levels (LEQ values) recorded were compared to their respective Sierra Leone Standards (SLS 83:2019) and IFC guideline values of 55dB for SLS day, 55dB for IFC Day, 45dB for SLS Night and 45 dB for IFC night.

5.7.1 Noise compliance criteria

Table 9: Sierra Leone Noise Standard-Ambient Noise Level SLS 83:2019

| Zone | Description Area of Noise Reception | Noise Level, dB(A) Leq | |
|------|---|------------------------|---------------------|
| | | Day (06:00-22:00) | Night (22:00-06:00) |
| A | Any building used as hospital, convalescence home, home for the aged, sanatorium and institutes of higher learning, conference rooms, public library, environmental or recreational sites | 45 | 35 |
| B | Residential buildings | 50 | 35 |
| C | Mixed residential (with some commercial and entertainment) | 55 | 45 |
| D | Residential + industry or Small-scale production + commerce | 60 | 50 |
| E | Industrial | 70 | 60 |

Shaded row shows applicable guidelines to this study

5.7.2 Mathen Noise Monitoring

The daytime ambient noise levels (dBA) for the project site and nearest residence were 47.8 dB and 52.7 dB and within the guidelines. For night-time assessment, the project site and nearest residence at Rogbatha recorded 55.0dB and 49.7dB respectively. These are above the guidelines and for the nearest residence, can be attributed to moving vehicles, Motor Bikes, Machine and human interaction noise. For the site, Night-time noise was mostly from rustling of leaves, birds chirping, frogs croaking and motor bike and tooting of horns by night riders.

5.7.3 Rogbatha Noise Monitoring

The daytime ambient noise levels (LEQ) at the Rogbatha PCA Pilot project site and the nearest residence were 55.0 and 66.1 dB (A), respectively. The ambient noise levels (LEQ values) recorded were compared to their respective Sierra Leone Standards (SLS 83:2019) and IFC guideline values of 55dB for SLS day, 55dB for IFC Day, 45dB for SLS Night and 45 dB for IFC night. The daytime ambient noise levels (dBA) for the nearest residence was above the SLS and IFC LAEQ guideline value this was mainly because of sounds from the engines of tractors, machines and cars passing, intermittent chatter from pedestrians passing by during the time of assessment.

The night-time ambient noise levels (LA_{EQ}) recorded were 43.3 dB (A) at the Pilot phase facility site and 41.2 dB (A) at the nearest residence respectively. The night-time ambient noise level for the project site and the nearest residence were within the Noise Level Guidelines for SLS and IFC. Noise was mostly from generator sound and motor bikes traveling along the main access that traverses the site.

5.7.4 Forikolo Ambient Noise Monitoring

The daytime ambient noise levels (LEQ) recorded were 50.1 and 52.4 dB (A) between the pilot phase site at Rogbatha and the community nearest residence. (The school was not considered as the nearest) respectively. The night-time figures were 42.4 and 42.8 dB (A) at the monitoring project site and the nearest residence respectively.

The ambient noise levels (LEQ values) recorded were compared to their respective Sierra Leone Standards (SLS 83:2019) and IFC guideline values of 55dB for SLS day, 55dB for IFC Day, 45dB for SLS Night and 45 dB for IFC night. The daytime ambient noise levels (dBA) for the project site was above the SLS and IFC LA_{EQ} guideline values mainly because of the constant tweeting, and warble from birds, taxi motor bike movement and crickets within the project concession. However, the night-time ambient noise level for project site and the nearest residence were within the Noise Level Guidelines for SLS and IFC LA_{EQ} guideline values.

5.7.5 Rogberekh Ambient Noise Monitoring

The daytime ambient noise levels (LEQ) at the Bureh Beach project site and the nearest residence were 46.2 and 41.5 dB (A), respectively. The ambient noise levels (LEQ values) recorded were compared to their respective Sierra Leone Standards (SLS 83:2019) and IFC guideline values of 55dB for SLS day, 55dB for IFC Day, 45dB for SLS Night and 45 dB for IFC night. The daytime ambient noise levels (dBA) for the nearest residence was within the SLS and IFC LEQ guideline value.

The night-time ambient noise levels (LAEQ) recorded were 41.7 dB (A) at the Rogberekh flood plain and 42.4 dB (A) at the nearest residence respectively. The night-time ambient noise level for flood plain and the nearest residence were within the Noise Level Guidelines for SLS and IFC.

5.7.6 Conclusion on Ambient Noise Monitoring

The ambient noise levels (LEQ values) recorded were compared to their SLS. The daytime ambient noise levels (dBA) for all sites were within the SLS. The night-time ambient noise level (dBA) for all sites were within the SLS.

5.8 Surface and Ground Water Sampling

The water table in the PCA project site is used as a potable water source by the locals; as a result, the proposed development will access ground water for irrigation, consumption and domestic use. Also, the project is not expected to have any adverse impact on ground water quality; however, there was need to do water wells and boreholes for ground water testing.

To assess surface water quality, water samples were collected from three (3) different locations within the project influence area (Rogbatha, Rogbereh and Forikolo) respectively, as per the procedures specified in the standard methods for examination of water, adopted by EPA. The results of the chemical analysis are summarized in Table 10.

In order to ascertain and categorize the existing drinking water, the quality of potable water needs to be compared with the existing standards that have been adopted by EPA. These World Health Organization WHO water standards are outlined in the last column of the table 10 below.

5.8.1 Surface and ground water quality Monitoring and Methodology

Surface Water samplings and testing were done at the nearest water source to the communities of Rogbatha, Forikolo, Rogbereh those includes stream and swamps. Parameters including Temperature, pH, TDS, Turbidity and Conductivity were measured in-situ by means of field kit. Calibration reagents are used to calibrate the Field Test Kit before each use.

Parameters analysed are pH (pH units), Conductivity ($\mu\text{S cm}^{-1}$), Turbidity (NTU), Dissolved oxygen (mg/l), Temperature (oC), Total Suspended Solids (mg/l), Ammonia (mg/l), Copper (mg/l), Iron (mg/l), Nitrate (mg/l), Nitrite (mg/l) HR, Potassium (mg/l), Orthophosphate (mg/l) LR, Sulphate (mg/l), Chlorine (mg/l) Chromium

5.8.2 Ground Water Sampling.

Ground Water testing was conducted at Mathen, Rogbatha and Forikolo. These includes the Borehole at Rogbatha (Pilot phase site) water well at Mathen and Forikolo which the community relies on, but often dried during the peak of the dry season.

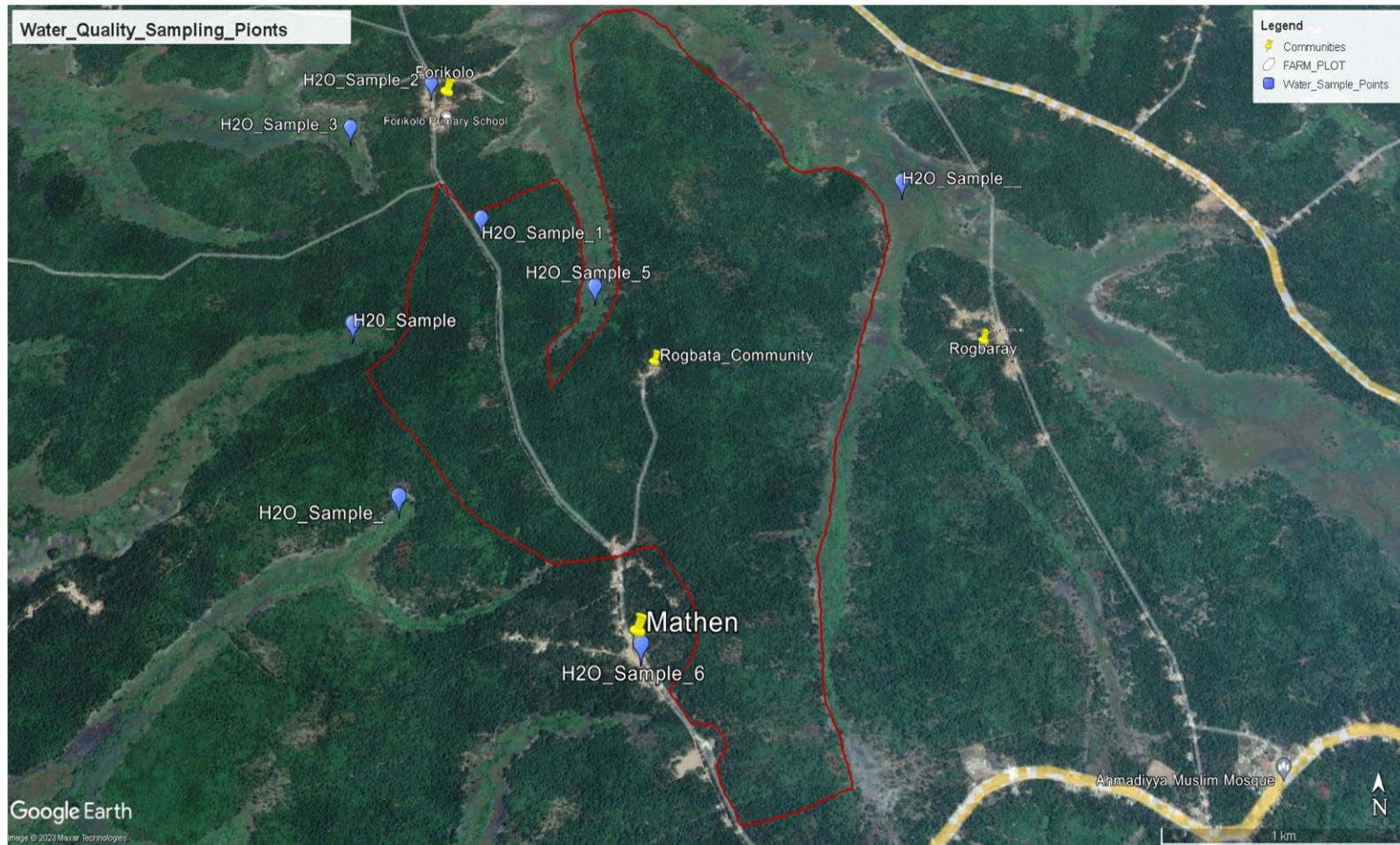
Parameters tested are as follows: **pH** (pH units), Conductivity ($\mu\text{S cm}^{-1}$), Turbidity (NTU), Dissolved oxygen (mg/l), Temperature (oC), Ammonia (mg/l), Copper (mg/l), Iron (mg/l), Nitrate (mg/l), Nitrite (mg/l) HR, Potassium (mg/l), Orthophosphate (mg/l) LR, Sulphate (mg/l), Chlorine (mg/l) Chromium, except **Total Suspended Solids**.

The table below present data generated and results of samplings. The also include WHO Water quality compliance criteria (See Results and analysis are presented below)

Table 10: Water quality sampling location and results

| No. | Parameter | Forikolo Water well | Forikolo Upstream | Forikolo Downstream | Rogbatha Borehole (project site) | Rogbatha Swamp Upstream | Rogbatha Swamp Down stream | Mathen Water Well | WHO Permissible Limits |
|-----|--|---------------------|-------------------|---------------------|----------------------------------|-------------------------|----------------------------|-------------------|------------------------|
| 1 | pH (pH units) | 6.59 | 6.1 | 6.21 | 6.07 | 6.12 | 5.22 | 6.17 | 6.5 -8.5 |
| 2 | Conductivity ($\mu\text{S cm}^{-1}$) | 144 | 4 | 5 | 12 | 9 | 3 | - | < 500 |
| 3 | Turbidity (NTU) | 0 | 0 | 13 | 0 | 0 | 0 | 0 | < 5.0 |
| 4 | Dissolved oxygen (mg/l) | 12.6 | 3.9 | 3.9 | 6.5 | 5.1 | 10.7 | 12.5 | > 6 |
| 5 | Temperature (oC) | 29.0 | 29.0 | 28.9 | 29 | 29.0 | 28.1 | 29.4 | - |
| 6 | Total Suspended Solids (mg/l) | - | 14 | 64 | - | 5 | - | - | < 248 |
| 7 | Ammonia (mg/l) | 0.07 | 0.12 | 0.11 | 0.09 | 0.46 | 0.11 | 0.01 | - |
| 8 | Copper (mg/l) | 0.025 | 0.17 | 0.20 | 0.14 | 0.11 | 0.025 | 0.025 | < 10 |
| 9 | Iron (mg/l) | 0.92 | 0.08 | 0.15 | 0.19 | 0.07 | 0.28 | 0.01 | < 0.3 |
| 10 | Nitrate (mg/l) | 1 | 0.14 | 0.13 | 0.20 | 0.28 | 0.1 | 0.005 | < 10 |
| 11 | Nitrite (mg/l) HR | 0.005 | 0.005 | 0.006 | 0.005 | 0.02 | 0.05 | 1 | 3.0 |
| 12 | Potassium (mg/l) | 4.5 | 0.6 | 0.35 | 1.1 | 0.35 | 0.35 | 2.5 | < 6.0 |
| 13 | Orthophosphate (mg/l) LR | 0.66 | 0.24 | 0.06 | 0.09 | 0.28 | 0.1 | 0.29 | < 0.035 |
| 14 | Sulphate (mg/l) | 2.5 | 12.5 | 23.1 | 6.4 | 5.4 | 2.5 | 2.5 | < 400 |
| 15 | Chlorine (mg/l) | 0.025 | 8.8 | 2.5 | 6.1 | 3.4 | 9.0 | 15.7 | < 250 |
| 16 | Chromium | 0.01 | 0.05 | < 0.03 | 0.06 | 0.01 | 0.01 | 0.01 | <0.05 |

Plate 11: PCA Water Quality Monitoring and Sampling Points



5.8.3 Results of Surface and Ground Water Quality Tests and Analysis

Forikolo

Ground water met the WHO water quality standards except for orthophosphate that fell below standards. The parameter is classed as having no known health effect.

Mathen: Ground water quality met the WHO water quality standards except pH and orthophosphate. Analysis; It is possible that the pH value must be influenced by two factors; natural occurrence (geological) or anthropogenic activities. Very critical, pH values can be harmful to both human and plant population. On the contrary, Orthophosphate has no known health effects on human or plant population.

Rogbatha

Swamp at Rogbatha flows downstream to Forikolo, at Forikolo, it was sampled at Forikolo swamp as downstream surface water.

Phenomenal, it was noticed that water submerges at Rogbatha village and re-surfaces behind the highlands of Komrabai.

Analysis; low DO possess threat to aquatic life because of rapid algae bloom resulting from the continuous use of fertilizers (phosphorus). OP has no known health effect on human and plants. Lower pH is detrimental effects and this is observed generally and inferred as geological formation of the area of some form of pollution. High level Chromium (hexavalent) has adverse impact on human health and plants. Positive aspect is that, it can be reduced using high end water filtration system.

Conclusion: Most of the water quality met the WHO standards except for the followings; Dissolved Oxygen (DO), Orthophosphate, (OP) pH and Chromium. See Annex (3) for Sampled Results.

5.8.4 Soil quality test and challenges

Soil sampling was undertaken and samples sent to Belgium. The results highlights some challenges that could be remedied. Soil quality challenges is been matched with lime stone to increase the PH value of the land that has had a low PH value of only 4.5 due to high concentrations of minerals . The application of lime-like dolomitic limestone. Successfully improved the PH on the land from 4.5 to 6 - 6, 5. This was successfully done by importing and applying lime-like dolomitic limestone. Approximately, 22 hectares has been limed and PH value was registered to be around 6 PH and suitable for cultivation. On the other hand, the project also intends to neutralize the soil by adding peat moss or compost regularly

5.9 Biological Environment

5.9.1 Forest ecosystems

The forest ecosystem of the entire 646 ha of the proposed PCA project leased area can be divided into transition or secondary forest (forest regrowth or 'farm bush'). The distribution of vegetation at the proposed project concession has been adversely impacted by human livelihood activities over the decades coupled with, climate and soil conditions.

5.9.2 Agro Ecological of the project site

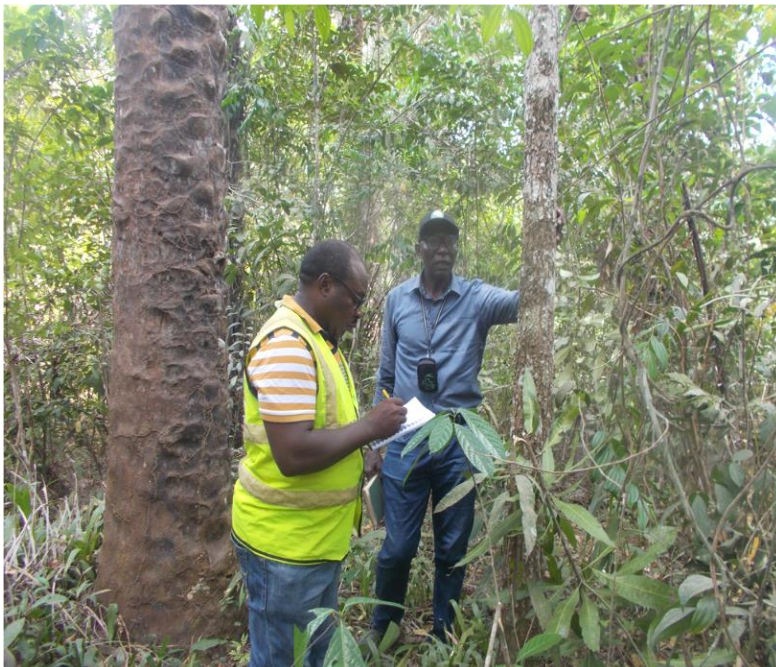
The agro ecological zones are the savannah woodlands in the uplands (Forikolo to Laminaia and Rogbereh–Laminaia) while swamp forest (woodlands) and seasonally flooded grasslands constitute the agro-ecologies in the Lowlands -Rogbatha and Rogbereh.

5.9.3 Upland Vegetation

The project Communities traverse a vegetation of mainly farm bushes embedded in a typical lowland and woodland savanna. About 85% of the project area is covered by farm bushes with vast area characterized and dominated by food and tree crop non-yielding palm trees (*Elaeis Guineensis*) and thick secondary undergrowth. However, there is no existing rainforest within PCA Mathen project areas. Forests are densest in the north-east (Laminaia) which is outside the project leased concession. In summary; the flora community study at Forikolo and Rogbereh captured indigenous plants of economic, herbal and medicinal values of substantial quantity that needs to be conserved. **See Annex 2** for details. Overall majority of flora assessed on site were found not to be of conservation concern.



Plate 9: Upland floral assessment



5.9.4 Lowland (IVS) Vegetation

The IVS is purely mesh land and flood plains. The catchment is characterized as woodland savanna featuring mostly common plants, ferns and an invasive grass species (panicum maximum).

Plate 10: Swamp vegetation and flood plain assessment



5.10 Fauna Study

The fauna study of the PCA project area was undertaken on a two pronged approach field, studies and literature reviews. The field approach was undertaken was first in August 2022 and February 2023.

The project area was observed to have diverse fauna. The seasonal field visits helped the consultants to confirm the existence of certain species during the raining and dry season especially for the flying invertebrates like butterflies, moth, wasps, bees, grass and leafhoppers, dragonflies and flying beetles, amphibians mostly of the Bufonidae, Arthroleptidae, Dicroglossidae, Hemisotidae, Hyperoliidae, Phrynobatrachidae, Pipidae, Ptychadenidae and Ranidae families, reptiles largely of the Agamidae, Scincidae, Elapidae, Natricidae, Colubridae and Pythonidae families, mammals and numerous species of birds. However, no bird, reptile, amphibian, mammal or invertebrate species is listed as species of conservation concern.

Amphibians

Ptychadena superciliaris, Sclerophrys regularis, Afrixalus vittiger Hemisus marmoratus, Hoplobatrachus occipitalis, Sclerophrys maculates, Phrynobatrachus calcaratus, and Xenopus tropicalis

Butterflies

Butterflies species identified includes but not limited to ;Catopsilia florella, J. terea, Mylothris chloris and Leptosia medusa were some of the most common species during the survey in August 2022 whiles, Azanus jesus, Danaus chrysippus, Elymniopsis bammakoo and Junonia terea.

Birds

Ploceus cucullatus, Pelecaniformes, fasciatus, Lophoceros nasutus, Corythaeola cristata, Tauraco, persa, Crinifer piscator, Bucorvus abyssinicus.

Mammals

Tragelaphus scriptus, Philantomba maxwellii, Herpestes naso, Crocidura poensis, Paraxerus poensis, Xerus erythropus, Lophuromys flavopunctatus, Cricetomys gambianus, Thryonomys swinderianus, Thryonomys swinderianus and Genetta.

Reptiles

Dendroaspis viridis, Lamprophis lineatus, Bittis arietans, Varanus ornatus, Lamprophis fuliginous, Philothamnus semivarigatus, and Chamaeleo gracilis.

5.11 Hydrological Environment

5.11.1 Sites of Higher Conservation Status of SLRE

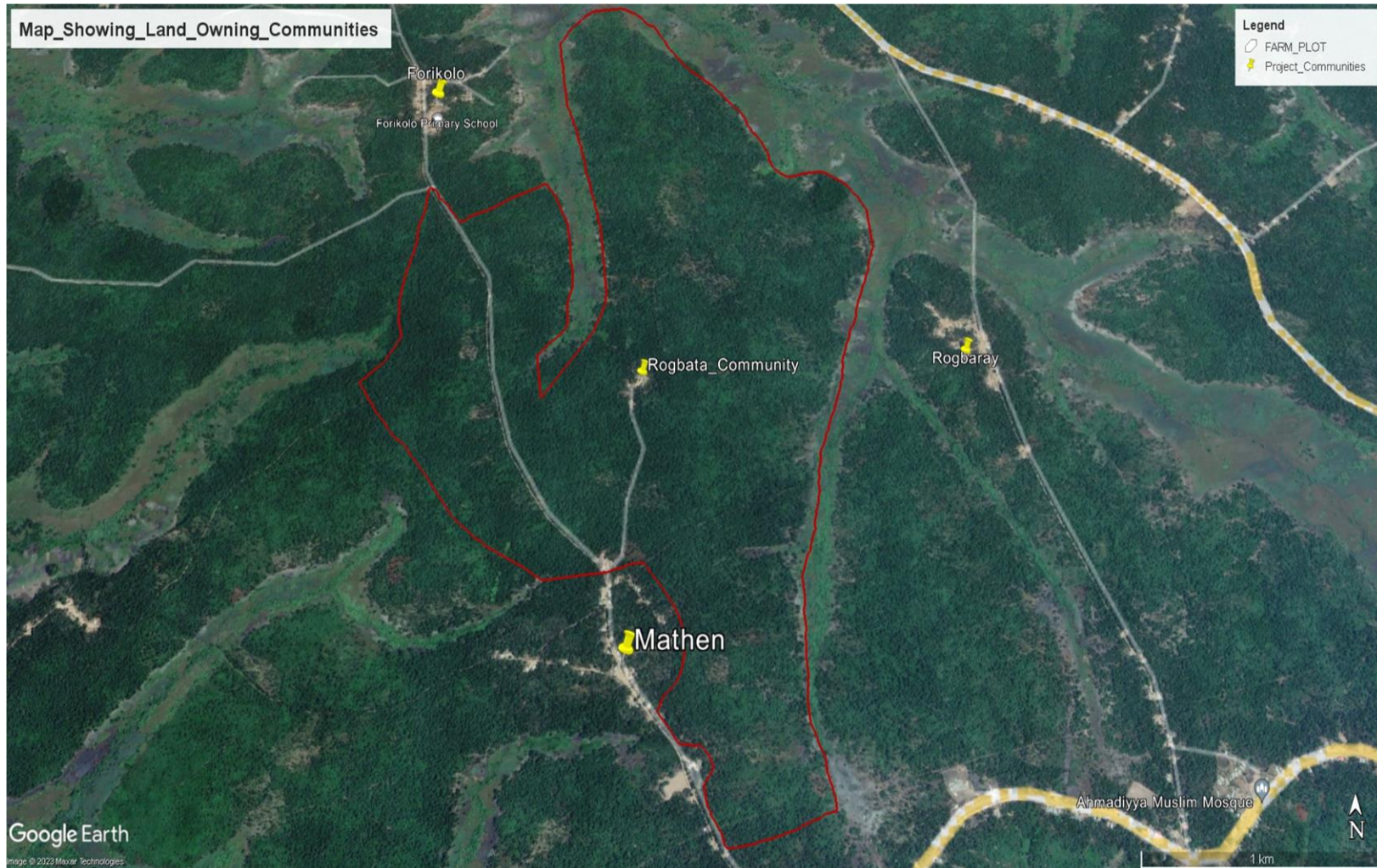
The following site were marked sites for higher conservation status of SLRE and to be totally protected;

Ref Source: SLRE Mgt Plan Final 2016-2022

- a. Aberdeen Creek;
- b. Bunce River mangrove estuary;
- c. The mangrove along the river for Maforkie and Kaffu Bullom Chiefdom;
- d. Rayale 1 and 2 islands in Koya;
- e. Mamiri village forest - Roponka section and Ka-gbu-gbum forest --- Benkia section for Chimpanzee (Koya);
- f. Bounce, Makorya and Mafaray mangrove Forest Island for Lokomassama;
- g. Mabakie, Yale lembeh, Mamynehsi, Katigbah (Devil Island) islands for Kaffu-bullom;
- h. Potko, Gberay and Mammaki for manatees (Kafu-Bullom);
- i. Mandina creek for crocodiles(Lokomassama);
- j. Mammanti River and Mamendu for crocodiles in Kaffu Bullom)
- k. Gbenti, Yongoro, Mamanki and Cotton swamps for frogs (Kaffu Bullom)
- l. Ka-gbubum forest in Koya for duikers,
- m. Kagbelei island r bushbucks still in Koya Chiefdom,
- n. Maforkie 46 protected areas
- o. Ro-Matim village & Keito for Chimpanzee (Lokomassama)
- p. Maforkie 11 communities protected sites

From literature review it was gathered that the *Recent comprehensive Participatory Rural Appraisal sessions (2014 under WCP)*, confirmed the site's richness in aquatic endangered or rare species such as crocodiles, dolphins, tortoises, turtles and manatees. Hotspots for chimpanzee and bushbuck are identified at terrestrial side of SLRE; primates and ungulates are present all long river gallery forests

Plate 11: PCA host Communities and water bodies within and outside the concession



5.12 Eutrophication

During the site visits in the month of October and November 2022. There was the presence of high algae bloom indicating the presence of high nutrient deposit on the surface water more at Forikolo which is down stream of the Rogbatha seasonal swamp.

Subsequent site visits in the months of February and March 2023 revealed that, the initial swamp at Rogbatha close to the pilot phase was no more available but the downstream swamp retain some water with algae bloom and flood plains. Similarly, flood plain was more evidence with small ditch of swamp at Rogbereh with some algae growth.

5.13 Socio-Economic Environment

Brief profile of the host communities

The socio-economic assessment of the project host communities conducted on 15/07/2022 and revisited on February 2023.

Leadership – the decision-making body in the community includes the ceremonial chief, headmen, youth leaders, chairlady and other traditional leaders (male & female) most channeled through the collective community elected committee.

Security – The crime rate in the community is very low, with most of the crimes committed being petty theft, the closet police station is at Komrabai.

Population

Population – the community has a total population of about 2,185 people with females forming about 55% of the population and males making the other 45%. This bring to an average of 9 persons per house.

| Community | Approx. , Pop | No. of houses | Approx., Percentage of male | Percentage of female | Percentage of youths | Percentage of the Aged | Physically challenged |
|-----------|---------------|---------------|-----------------------------|----------------------|----------------------|------------------------|-----------------------|
| Mathen | 900 | 110 | 40 | 60 | 70 | 15 | 2 |
| Rogbatha | 85 | 9 | 35 | 65 | 45 | 30 | 1 |
| Forikolo | 500 | 50 | 40 | 60 | 60 | 20 | 2 |
| Rogbereh | 700 | 70 | 40 | 60 | 70 | 25 | 3 |
| Total | 2,185 | 239 | | | | | |

Livelihood Activity

Economic Activities – the major economic activity in the communities is agriculture, with the major cash crops being cassava, rice, maize, groundnut and garden eggs.



| Activities | Mathen | Forikolo | Rogbatha | Rogbereh |
|----------------------------------|------------|------------|------------|------------|
| Farming /common cultivated crops | Cassava | Cassava | Cassava | Cassava |
| | Potatoes | Potatoes | Potatoes | Potatoes |
| | vegetables | Vegetables | Vegetables | Vegetables |
| | | Rice | Rice | Rice |
| Hunting | Yes | Yes | Yes | Yes |
| Fishing (anglers) | x | Yes | x | Yes |
| Charcoal burning | Yes | Yes | Yes | Yes |
| Carpentry and wood works | Yes | Yes | x | x |
| Crafts and arts | Yes | Yes | Yes | Yes |
| Traders | Yes | Yes | Yes | Yes |

The table below present the population count par village and the number of men , female and youths

| Name of community | Mathen | Forikolo | Rogbatha | Rogbereh |
|-------------------|--------|----------|----------|----------|
| No of farmers | 634 | 400 | 47 | 541 |
| Men | 312 | 173 | 18 | 319 |
| Female | 226 | 194 | 29 | 118 |
| Youths | 96 | 33 | 6 | 104 |

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The tables A-D below present the number and type of income generating activities from the land and forest resources and estimated amount per annum.

| Mathen Community | Men | Female | Youth |
|--------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Type of activity | Farming | Farming | Farming |
| Type of crops | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice |
| Estimated revenue generated per year | \$ 260 | \$130 | \$ 540 |
| Charcoal burning/fuel wood | Home use | Home use | Home use |
| Medicinal herbs harvesting | Home use | Home use | Home use |
| Building poles | Home use | Home use | Home use |

As in all other three communities of interest to this assessment, Rice and cassava are cultivated primarily for the family consumptions and a little for sales. Potatoes and vegetables are mostly for commercial purposes. Yearly fixed income per farmer were not certain because non the farmers could boast of maintain specific acreage of land or swamp for two farming season consecutively. Due mostly to lack of financial means, physical strength, medical and other problems.

| Rogbatha Community | Men | Female | Youth |
|--------------------------------------|--|-------------------------------------|-------------------------------------|
| Type of activity | Farming | Farming | Farming |
| Type of crops | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice |
| Estimated revenue generated per year | \$ 110 | \$130 | \$ 540 |
| | Charcoal burning/fuel wood (Home use) | Home use | Home use |
| | Medicinal herbs harvesting (Traditional healing) | Commercial | Not involved |
| Estimated revenue generated per year | Not for payment just gifts after treatment | \$55 | Not involved |
| | Building poles (Commercial purpose) | Not involved | Building poles (Commercial purpose) |
| Estimated revenue generated per year | \$400 | | \$600 |

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| Rogbereh Community | Men | Female | Youth |
|--------------------------------------|---|-------------------------------------|-------------------------------------|
| Type of activity | Farming | Farming | Farming |
| Type of crops | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice |
| Estimated revenue generated per year | \$ 700 | \$310 | \$ 240 |
| | Charcoal burning/fuel wood (Home use) | Home use | Home use |
| | Medicinal herbs harvesting (Traditional healing) | Commercial | Not involved |
| Estimated revenue generated per year | Not for payment just gifts after treatment and also for male society initiation rituals | \$200 | Not involved |
| | Building poles (Commercial purpose) | Not involved | Building poles (Commercial purpose) |
| Estimated revenue generated per year | \$800 | | \$1,200 |

| Forikolo Community | Men | Female | Youth |
|--------------------------------------|--|-------------------------------------|-------------------------------------|
| Type of activity | Farming | Farming | Farming |
| Type of crops | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice | Cassava Rice Potatoes Rice |
| Estimated revenue generated per year | \$ 490 | \$460 | \$ 1050 |
| | Charcoal burning/fuel wood (Home use) | Home use | Home use |
| | Medicinal herbs harvesting (Traditional healing) | Commercial | Not involved |
| Estimated revenue generated per year | Not involved | Strictly for traditional healing | Not involved |
| | Building poles (Commercial purpose) | Not involved | Building poles (Commercial purpose) |
| Estimated revenue generated per year | \$600 | | \$1,700 |

Uses and Importance of the Swamp and Upland to the host communities

Swamps Ecology

The swamp is a major source of farming all year round. The farmers benefit from the swamp for rice and vegetable farming as their main source of livelihood activities. Majority of the swamp users are women because they derive their means of supporting their family (Vegetable cultivations) especially for those that have their children going to school. These groups of women include vulnerable women such as widows and single mothers. Women from polygamous homes whose husbands do not have enough to support the number of children per wife.

An estimated (80%) of women in the community mostly engage in farming activities (Vegetables, Rice, fire wood fetching and medicinal herbs processing) in order to provide financial assistance to their husband, children and aged parents as the case may be, the rest engage in petty trading with few being housewives.

The swamps also serve as a source of portable and domestic water source for the locals and also for fishing (Rogberah) by anglers.

Upland Farm Bush

The upland: these areas of the community serve for the following purposes.

- Cultivation of cassava, potatoes, rice and other crops on farm lands
- Source of medicinal herbs for local treatment and cultural practices.
- Building poles and roof thatches
- Material for crafts and weaving ropes
- Hunting ground for hunters and;
- source of fuel wood for the meet their energy needs (Fuel wood)

Over 80% of the population of the community depends on farming but mostly on subsistence level. Main crop includes production of rice, potatoes, cassava and groundnuts as source of income. About 10% of the locals are into charcoal burning, skilled works such as carpentry and woodworks, tailoring, craft and arts making. Materials for arts and crafts are sourced from local plants such as raffia palms, ferns, palm fronds and some other plants used in making ropes.

Several houses in each community have different fruits planted; mango, oranges, lime tree, guava plants, banana and lemongrass. Coconuts, these are harvested seasonally as source of income.

Few of the members of each community are into hunting to meet protein need for their family and commercial purpose. Mostly for rice and vegetable farmers. Other livelihood, is transportation. Some percentage of the youths are into motor bike taxi.

The biggest social challenge facing the community is the absence of job opportunities for the youth in the community.



Religious/Cultural Site/ Sacred Grooves

Religiously, Islam is the dominating religion in the chiefdom as 99.9% of the population are Muslims. Churches and Christians are hardly seen in the community and this suggests that Christians are in the minority. Culturally, the chiefdom has diverse ethnic groups but the major ones include Temne and Soso who share almost similar cultural practices. Bondo (female genital mutilation) and Ojeh society are widely practiced among the ethnic groups in the chiefdom.

Culture – abusive language and sexual relations with married women are acts that is prohibited in the community. The Mathen and Rogbereh communities has one sacred bushes each that are not accessible to everyone, only the initiated are permitted to those areas.

| | Church | Mosque | Sacred grooves | Possibilities of relocating sacred grooves |
|----------|--------|--------|----------------|--|
| Mathen | None | 1 | Yes | Yes |
| Forikolo | None | 1 | x | |
| Rogbatha | None | 1 | Yes | yes |
| Rogbereh | None | 1 | Same as above | Same as above |

The communities of Mathen has one whiles Rogbatha and Rogbereh jointly have their sacred groves within the leased land portion. Planned option is open for the proponent to approach the communities for possible relocation and accept and finance traditional requirements and time frame for it to be executed.

List of Land Owners by community

| Community | Name of family | Remarks | Land size by community |
|------------------------|--|---|---|
| Mathen | <ul style="list-style-type: none"> Kuku Bana Forigbondia | - | Please See map of the leased land in Annex 4 |
| Forikolo | <ul style="list-style-type: none"> Kamara | - | Second largest portion of land portion |
| Rogbatha and; Rogbereh | <ul style="list-style-type: none"> Kamara family | <p>The families at Rogbereh and Rogbatha are one.</p> <p>It is understood that the community of Rogbatha relocated to form a settlement named Rogbatha but still united</p> | <p>These two community owns the highest portion of land leased by PCA.</p> <p>Followed by Forikolo and Mathen with the least portion.</p> |

Health Condition

Consultation with the communities and health personnel revealed that all the affected communities of the project especially Mathen, Forikolo, Rogbatha and Rogbereh relies on the medical services and treatments provided by the health centre situated at Mathen. The centre is in a very depreciated condition inwardly, lacks basic hospital facilities such as electricity, bed, labour room accessories, pharmaceuticals and this has created a challenge not only for the medical practitioners but patients as well.

On the other hand, the various community members still rely on traditional herbs as alternative primary health care system in the communities. According to our findings, one of the reasons for their reliance on herbs is based on the level of income of the people as majority of the people cannot afford to pay for prescribed drugs and the services health personnel are providing.

In addition, Reliance on local herbs for treatment and lack of health awareness raising to the communities was pointed as a contributing factor that makes the locals to continue reliance on herbs. These two factors have greatly influenced many people to treat themselves at home or go to traditional herbalists when they are sick rather than visiting health facilities. This has made community people to suffer from certain common diseases that could be easily cured at the health centre.

In addition, the consultation with health personnel also indicated that, the most common diseases in the communities are Malaria, Typhoid; hypertension; fever and diahorea.

Education

Currently, there are three schools in the communities (Mathen and Forikolo) of which two (2) are primary schools and one secondary school. Rogbereh community does not have a school and all the children have to walk long distance to access the school in the nearby village. Regardless of the presence of schools in the communities, 50% of the youths are into bike riding and this percentage indicates that there is high school dropout among young people in the communities. This further indicates that in the long run, the communities will lack skilled and technical human resource that might be needed to work in the company.

Water and Sanitation

There is a major challenge in the availability of pure and safe drinking water in the project affected communities especially during the raining season. The main sources of water for the communities are boreholes/water wells, stream during the dry season. In the raining season, there is substantial reliance on rain water for drinking and domestic purposes. During the dry season, almost all the water wells get reduced volume and the only source of water at that period is the stream water which runs south of the project area and flows downwards towards the north and empties in the Atlantic Ocean in Bailor. There is lack of toilets facilities in some villages and as a result open defecation is a common practice among the people and during the raining season, all the human wastes find its way into the stream water which locals fetch for their drinking and domestic use. In addition, waste management is totally absent in the communities as there is no waste management system.

Energy

The communities lack access to electricity, therefore energy is a major challenge facing the communities as 99.9% of the people do not have access to electricity and this has deprived the communities from developments associated with energy, wider media option etc. Majority of the people in the communities depend heavily on solar lamps and Chinese lights as source of lighting while few commercial establishments depend on generators to charge phones.

For cooking, firewood and charcoal are the major sources of energy and consequently, deforestation for charcoal burning and fire wood is widely practice in all the project affected communities. Some people buy from trucks transporting charcoal from other regions across the chiefdom to the city centres.

Telecommunication

Telecommunication network is not very effective. Orange and Africell are the most popular network providers in the country still lacks effective network service in the community. Network fluctuates at some locations within each of the four communities as a result of attenuation.

Access Road.

The Mathen communities has only one main access road linking Rogbatha and Forikolo community to the Port-Loko lungi highway. Rogbereh can be accessed through the main highway linking Mathen to Komrabai. Main means of transportation is taxi motor bike.

Majority (80%) of people in the community use taxi motorcycles as a mode of transportation, with vehicles (18%) and travelling by foot (2%) being the other modes of transportation (Bicycles).

The feeder road is untarred and exposed to erosion and muddy condition during the raining season. Dust level during the dry might be low but it is expected to increase with more vehicle from the project moving along the main access road. The heavy duty trucks and other forms of the project vehicle might further deteriorate the road condition. The road have some curves and narrow. It was observed that the bike riders do not exhibit proper formal driving skill. The main schools in Mathen community is approximately 100 meters by the entrance from the port Loko highway to Mathen village.

The hospital at Mathen which is less than 1 Km from the project pilot phase site, patients access the center through the same access road. More critical, the same access road traverses the schools, main clustered residential of the Mathen village onwards through the hospital, Foronkolo School and beyond. It is expected that the PCA project vehicles and traffic movements will change the dynamic (frequency) of vehicle and safety along the access.

5.14 STAKEHOLDER CONSULTATIONS

Projects that have environmental, social and health impacts require the involvement and participation of relevant stakeholders at the different stages of the project ranging from project planning, design and implementation. The involvement and participation of relevant stakeholders is in accordance with IFC Performance Standard (PS) 1 - 8 respectively, the International Association of Impact Assessment (IAIA) and is widely recognized as an important component in the environmental and social impact assessment (ESIA) due to the following:

- It informs and involves interested and affected stakeholders to understand about the project and contribute to EIA process by raising issues/concerns that have the potential to disrupt the operation of the company.
- Stakeholders' concerns and feedback can be a valuable source of information that can improve project design, outcomes and this can help a company to identify and control external risks. It can also form the basis for future collaboration and partnerships with affected and interested persons.



5.15 Institutional and Community Consultation

During the institutional and community consultation, the consultants focused on the following questions:

- Uses of the lands to the community
- Identify land owning families and their concerns and expectations
- Wanted to know if the land owners know the details of the project and also if they were consulted
- Land tenure system
- Where farmers compensated for their crops?
- The population of each village and size of land each village leased to the company
- Relevant laws, policies and regulations that need to be reviewed

The table below maps out of the potential role, interest and influence in the Pee Cee Agriculture for each of the stakeholders at the government level, district and local levels.

Table 11: Number of stakeholders consulted at the government, district and local level

| Group of stakeholders | Stakeholders | Location of consultation | Total number of persons met | Total women met | Interest | Influence |
|-------------------------|--|--------------------------|-----------------------------|-----------------|----------|-----------|
| Project proponent | Pee Cee Agriculture | Freetown | 4 | 0 | High | High |
| Regulatory Institutions | Environment Protection Agency (EPA) –SL | Freetown | 4 | 1 | High | High |
| | Ministry of Environment | Freetown | 2 | 0 | High | High |
| | Sierra Leone Investment and promotion agency | Freetown | 4 | 1 | High | High |
| | Conservation Society of Sierra Leone | Freetown | 3 | 1 | High | High |

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| | | | | | | |
|-------------------|---|---|----|-----|------|--------|
| | Ministry of Agriculture, Forestry and Food Security | Port Loko | 2 | 1 | High | High |
| | National Water Resource Management Agency | Freetown | 2 | 1 | High | High |
| | Public Private Partnership | Freetown | 1 | 0 | High | Medium |
| | National Protected Area Authority | Freetown | 0 | 1 | High | Medium |
| | Sierra Leone Chambers of Agricultural Development | Freetown | 1 | 0 | High | Medium |
| | Port Loko District Council | Port Loko | 4 | 1 | High | High |
| Other Stakeholder | | | | | | |
| | Traditional authorities and other stakeholders | Mathen, Forikolo, Rogbatha and Rogberek | 13 | 3 | High | High |
| | Women | Mathen, Forikolo, Rogbatha and | 0 | 104 | High | Low |

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| | | | | | | |
|--|-----------------------|---|-----|----|------|--------|
| | | Rogbereh and other villages | | | | |
| | Physically Challenged | Mathen, Forikolo, Rogbatha and Rogbereh | 5 | 3 | High | Low |
| | Farmers | Mathen, Forikolo, Rogbatha and Rogbereh | 100 | 76 | High | Medium |
| | Land owners | Mathen, Forikolo, Rogbatha and Rogbereh | 12 | 4 | High | High |
| | Youth | Mathen, Forikolo, Rogbatha and Rogbereh | 160 | 80 | High | High |

The total number of stakeholders consulted at the government, district and local level is 594 and this number constitute about 74% of the total 800 stakeholders we targeted to consult.

5.16 Comments, Views and Opinion of Stakeholders about the project

All stakeholders consulted were pleased and enthusiastic with the proponent intents because they are of the opinion that the project will help solve one the major challenges in their lives which is creation of job opportunities for the youths and the women. For this reason, they expressed willingness and determination to give full support for the successful implementation of the project if procedures are followed.

A summary of the outcome of the initial consultations are provided below. These are mostly concerns and suggestions/interventions from the institutional and communities' stakeholder engaged.

Table 12: Specific Concerns raised by stakeholders consulted and proposed solutions.

| Name of Participant & Designation | Name of Institution/ Village | Phone Number | Concerns /Comments/ Opinions |
|--|---|--------------|--|
| Dr. Gavao Bondi | EPASL | +23276883979 | <ul style="list-style-type: none"> • Project Registration –The project has to purchase a screening form • No large scale onion farming in the country for now. Only few farming especially in Port Loko district so we hope it will benefit the community skill wise. • Temporary permit, the project request for temporary permit shall be granted based on the details and explanations from the project coordinators and the consultants. • It must be made clear that such permits are not granted but we are counting on the credibility of the project coordinators and the consultants to document and deliver the report with details of the issues discussed herewith professionally for the pilot phase and not more. • The permit shall be valid for only two months from the date of issuance and it's not renewable. |
| Mr. Brima Bangura Extension Officer | Subject Matter Specialist (SMS) Extension (MAFFS) | 079639454 | <ul style="list-style-type: none"> • The Agricultural Extension division of Port Loko accepts the operation of the project in the district because it has the potential to bring development. • In terms of the present and future development of the proposed site, he has not got any information from the Ministry of any future development of the lands. Therefore, the present and future |

| | | | |
|-----------|--|-----------|---|
| | | | <p>development of those lands rest on the shoulders of land owners.</p> <ul style="list-style-type: none"> • The Agricultural Extension Division in the Ministry of Agriculture, Forestry and Food Security has the mandate to provide trainings to local farmers on modern farming techniques. It disseminates information to farmers and establish demonstrations programs on different crops (Maize, Onions; groundnuts; rice; vegetables etc.) farming processes • MOE have technical people, known as subject matter specialist (SMS) and because of this they would like to encourage agricultural investors to always engage with the extension unit as they have open door policy to give maximum support for investors. • The extension unit is divided into five blocks and each block is subdivided into two – three chiefdoms headed by block extension officer. • Below the block extension officer, there is field extension officer who report directly to the block extension officer who also report to the extension officer and the extension officer report directly to the management. • The field extension officers are responsible for identifying farmer base organizations (FBOs). • Maforki and Baki Loko Chiefdoms are alternative sites/ chiefdoms to consider for the cultivation of onions because they have fertile inland valley swamps. But people and investors just concentrate at Kafu Bullum and Lokomasama for onions cultivation. |
| Ya Almamy | Sierra Leone Women Farmers Forum (SLWFF) | 088857875 | <ul style="list-style-type: none"> • Sierra Leone Farmers’ Forum is a forum established with the primary aim of bringing together all women that are actively engaged in agricultural activities for women development • The forum has a branch in Lungi headed by Mary Mani • Believe that the operation of the project in Lungi and Lokomasama will benefit the |

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| | | | |
|---|---|-----------|---|
| | | | forum members since the production of onions in those areas is dominated by women and they will have more opportunity to be working in the farm. |
| Mr. Charles Bangura Director of Ministry of Agriculture Port Loko District | Ministry of Agriculture, Forestry and Food Security (MAFFS) | 076180600 | <ul style="list-style-type: none"> • After identifying the farming sites, he and the M&E conducted crop compensation on behalf of Pee Cee Agriculture. • During the assessment, land owners and community stakeholders (The paramount chief, chiefdom speaker and section chief, Resident Minister etc.) were identified and engaged to officiate. • The engagement of land owners and community stakeholders helped the assessment to be successful. The land owners and community stakeholders participated in the whole exercise and were satisfied with the crop compensation. • The community asked what can be done for their crops. • The community farmers were informed that they would be compensated for their crops. Upon receiving this information, the farmers started planting again in the sites just to attract more compensation package. • Because of this, some plants/crops were condemned and the Crop compensation document was used to measure the crops and GPS was also used. • After conducting the crop assessment, he personally compiled a report which was submitted to the Minister of Agriculture. • The management of Pee Cee Agriculture and Ministry of Agriculture had a discussion on the assessment report and the payment of crops that would be destroyed as a result of the PCA farming processes of the project. • Farmers were compensated for their crops and a lease agreement was made between the land owners and Pee Cee Agriculture. • Listing of farmers engage in the different types of crops was also carried out. |

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| | | | |
|---|----------------------------------|-----------|--|
| | | | <ul style="list-style-type: none"> • All the farmers and land owners are aware of the processes because they were informed prior to the commencement of the entire processes. • For the lease agreement, Land Lease Agreement was undertaken in conformity with the laid down policy. • All wet lands are owned by the government but that was not followed, because land in the interior are owned by families and communities and consequently lease agreement was made between the Pee Cee Agriculture and the land owning families. • Three families were identified in the four communities as owners of the land • In terms of the use of fertilizer, the ministry have guidelines for application of fertilizer and other agro- chemicals. For this, they are encouraging farmers and investors to liaise with the Ministry for pest control and application of chemical. • The ministry does not have a particular guideline on waste management. Therefore, Agro chemical waste containers of chemicals need to be managed well by the project. |
| Arthur Allieu Chief Administrator | Port Loko District Council | 076767136 | <ul style="list-style-type: none"> • Wanted to know if Pee Cee Agriculture project has been registered to the District council • Wanted to know if the lands have been secured • A copy of the lease agreement should be sent to the District Council for filling purpose • The council has the mandate to create the enabling environment for private sector to thrive • The council had secured a landfill for waste disposal at Lungi but is not yet operational • The council have no existing solid or liquid waste management company or landfill at Lokomasama therefore the company will have to explore practical and best practices to manage their wastes |

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|---|----------------------------------|-----------|--|
| David .B. Conteh Monitoring and Evaluation Officer | Port Loko District Council | 074525307 | <ul style="list-style-type: none"> • There should be regularly and joint monitoring between the council and Pee Cee Agriculture to make sure that environmental and social best practices are integrated as a sustainable component of the project. • The involvement of M&E, Development and Planning Officer and Chief Administrator is very important for the successful execution of any project or investment in the district. • The M&E team is requesting a site visit to the site of Mathen - |
| Aisha .M. Kabba Gender Officer | Port Loko District Council | 073056836 | <ul style="list-style-type: none"> • Women plays pivotal role in the agricultural activities as they dominate their male counterpart in farming in the district. (No data sighted) but their contribution is not recognized. Therefore, the involvement of women in the project/investment is very important. • In terms of employment, the management of Pee Cee Agriculture should use the 30 percent quota for women in their activities. • Women in the host communities need to be engaged to identify their needs and challenges • Establishment of village saving scheme is also important to support women in doing business. • Some of the challenges women are confronted with includes; Marginalization in decision making; so they don't speak up • The council have encouraged women to take up key position during the formation of community development committee • The Local Government Act of 2004 made it categorically clear that women need to be involved in all development activities and decision making process of their community. |
| Nyuma Maningo Development and Planning Officer | Port Loko District Council | 076859658 | <ul style="list-style-type: none"> • The project document should been shared to the District Council so that the council will capture and integrate the proposed activities of Pee Cee Agriculture into the District Council development plan. |

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| | | | <ul style="list-style-type: none"> • The Development and Planning Department as part of its activities, mobilize community through the councilors and ward committee members to support investors in their communities • When there is conflict, the department has the responsibility to involve in resolving conflict. • Development and Planning Department always involve in the execution of project and guide investors in the sustainable management of their investment in the district. • The department has bi- monthly coordination meetings with development organizations and it is through these meetings they can track the progress of development partners in the district. |
| Gbassay Bangura Secretary | National Federation of Farmers of Sierra Leone | 077253879 | <ul style="list-style-type: none"> • Welcomed the Pee Cee Agricultural project in the district and believe the community will also accept this project • They have a land they intend to give to investors and their office is always open to investors. |
| Alimamy .Y. Kargbo Director Farm for Development | Farmers Association | 077409190 | <ul style="list-style-type: none"> • Welcome and expressed thanks and appreciation for the intervention of Pee Cee Agriculture in the cultivation of onions in the district. • There are other chiefdoms that also have fertile soil suitable for onion cultivation. Therefore, wanted Pee Cee Agriculture to establish same investment in other chiefdoms especially Maforki chiefdom. • However, Pee Cee and Agriculture did not make a mistake for choosing Kafu Bullom for their investment since the chiefdom is known as a hub for onion cultivation. • Requested Pee Cee and Agriculture to provide training for the farmers on modern techniques of farming. |
| Hassan .S. Dumbuya Public Relations Officer | National Federation of Farmers of Sierra Leone | 030527794 | <ul style="list-style-type: none"> • Wanted to know the life span of the investment. (25) years • Welcome the investment in the district and will support it to thrive because job opportunities will be created. |

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| <p>Yatta .H. Kamara</p> | <p>Wetlands Manager National Protected Area Authority</p> | <p>076307874</p> | <ul style="list-style-type: none"> • The National Protected Area Authority has the mandate to manage and protect fauna and flora in its natural state and conserve biodiversity. • In managing and protecting protected areas, the agency does not only focus on coastal wetlands but also protect inland wetlands. • The agency has wetlands conservation strategies and wetlands inventory which the proponent is supposed to have accessed before acquiring the land and commencement of the any activity on the location • Though she has not visited the site, but from the geographical description given by the consultants, she is very sure the project is close to the buffer zone that feed the creek and all wetlands found around protected areas are protected but those lands will not stop investors or government from investing. This is because in as much the Ramsar Convention requires contracting parties to designate suitable wetlands in their territory under the Ramsar List of Wetlands of International Importance, it also requires state parties to use the designated wetlands wisely and taken care of. Thus, wetlands are meant for wise use as long as the developmental project has sound environmental management plan. • Considering the size of land to be used and the nature of the project, it is clear that the project will create employment opportunities, boost local businesses; improve the living standards of the people and reduce the challenges of foreign exchange because onions will not be imported any more. • In as much as the project has lots of economic benefits, it is important to note; any investor wishing to invest in the buffer |
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| | | | <p>zone is expected to pay a sum of money to the agency to protect and maintain other lands that are commensurate to the ones taken for development purposes.</p> <ul style="list-style-type: none"> • Conscious steps needs to be taken by ensuring that aquatic organisms and other wildlife are not endangered by the use of Agro-chemical chemicals |
| Ansumana .B. Turay | National Protected Area Authority | 076857856 | <ul style="list-style-type: none"> • The mandate of the agency was initially part of the Forestry Division in the Ministry of Agriculture but because of issues of conservation and priority. It was clear that priority was not too much on conservation but rather on money making. • The country have three directorate one department (directorate of community forestry, directorate of commercial forestry and directorate of wildlife conservation and forest management) but conservation was given very little attention. • That circumstance gave rise to the establishment of National Protected Area Authority with the intent to protect fauna and flora in their natural state. • Wetland ecosystem cover the area Pee Cee Agriculture intends to do their farming. • The wetlands in those areas serves as an intermediary and breeding ground for fishes because they are living partly in terrestrial par and aquatic life. They survive by this pattern in order because the unable to adapt to harsh condition of the outer sea and that of the terrestrial. |
| John .D. Brima | Assistant Director Ministry of Environment and Climate Change | 076892833 | <ul style="list-style-type: none"> • Concerned on the exact planting location (low land, upland or forestry, inland valley swamp or boli land). • Cannot raise concerns about the impacts of the project on the forestry and |

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| | | | <p>biodiversity unless he pays visit to the site.</p> <ul style="list-style-type: none"> • The project success depends on the Environmental Impacts Assessment (EIA). • Advised that the consultants should understudy and describe the estuary and the wetlands in its context and uniqueness • Responding to terrestrial species of conservation concern, he said there are lots species that can be found at Lokomasama axis which of conservation concerns as they are perceived to be near extinction • Wanted to know if the company is going to have environmental management plan since large portion of trees will be cleared? • Onions do not need chemical fertilizer, its need organic fertilizer. |
| Victor Bangura | Director of Import Promotion Sierra Leone Investment and Export Promotion Agency | 078322563 | <ul style="list-style-type: none"> • Asked if the EIA process has been completed and if the land has already been leased. • Asked if the land is closer to the Lungi International airport • The EIA should have been done and have the license before leasing the land this is because should EPA has issue with the land acquisition, how will that be managed? • Port Loko District have mining concessions and most times the people are not aware about those concession. If say you want land they just give the land. What is the land is part of the concession what are you going to do? • Wanted to meet with the management of Pee Cee because they want to know if the land acquisition has processes were |

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| | | | <p>followed</p> <ul style="list-style-type: none"> • SLIEPA has an entry strategy • Wanted to know the number of engagements held with community stakeholders and how in-depth was the consultation • When leasing a land all the discussions needed to be recorded because the people that leased the land today might not be present today any if any issue arise tomorrow those recordings will be used as evidence. • The agency has general investment incentives and does not have specific incentives for specific products. Therefore, Pee Cee Agriculture project can only benefit from the general incentive. • The agency does have a generalized policy and most times their policy and guidelines development is driven by the type of investments an investor is undertaken. • The Agency will engage with Ministry of Finance to develop sector incentive for onions. • Not sure if the Agency has export policies for onions, but since the target market for Pee Cee Agriculture is Mano the River Union countries, therefore, it important to follow the ECOWAS Trade Liberation Scheme. |
| Abdulai David Assistant Biodiversity Officer | Conservation Society of Sierra Leone | | <ul style="list-style-type: none"> • CCSL will be happy to work with Pee Cee Agriculture to ensure project deliverables are achieved. • Sierra Leone has four marine protected areas and because of that, he wanted to know which of the protected area is close to the project site. |

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| | | | <ul style="list-style-type: none"> • CCSL is not only visible in the terrestrial habitants but also instrumental in marine ecosystem. • Have implemented a project in Yawri Bay and it is one of the marine protected areas • On a yearly basis, CCSL implement it traditional activities in the four marine protected areas which is annual water bird census. • Completed a study in January 2023 on water bird census and the studies helped to have a comprehensive data on birds. • In doing the EIA studies, it is important to have discussion with CCSL to tell the consultant exactly how the project the will look like, what will the impact of the project on the biodiversity. • CCSL is more interested in the biodiversity ecosystem • Mostly agricultural activities are more situated in terrestrial parts and because of this he asked if inland valley swamps (IVS) will be used. |
| Edward Sesay Head of Programmes | Conservation Society of Sierra Leone | 078452553 | <ul style="list-style-type: none"> • Before raising concerns on biodiversity, he asked for the map delineation of the project area so that he could ascertain if the project does not fall into the projected area. • Wanted to know the type of farming Pee Cee Agriculture wanted to undertake • Interested to know more about the project especially the extent and nature of the project. • Wanted to know if the consultants have contacted the NPPA • For them to give an independent opinion on the impact of the project on |

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| | | | <p>biodiversity, it is important for them to pay a visit at the project site to do their assessment.</p> |
| <p>Dr. Ernest .T. Ndomahima Head of Department</p> | <p>Institute of Marine Biology and Oceanography (IMBO)</p> | <p>076613980</p> | <ul style="list-style-type: none"> • Wanted to know the extent of the area the project will be implemented • Have to look at the soil and the activities • Wanted to know if the Iron Ore rail way passes through the project site • Advised Pee Cee Agriculture to look at the rainfall patterns, animals and birds and the normal life style of the people • Concerned on the variety of onions to be planted • Communities need to be involved in the project so that potential conflict will be averted. • Who are the dependents on the lands and what are they doing now. • Identified land users so that they can be compensated. • Gender mainstreaming should be integrated the operation of the company. • Priority should be given to the people in the area especially when it come employment opportunities. |
| <p>Idriss Mo-Bash Mohamed Kamara</p> | <p>EPASL</p> | <p>+23230147003 +23276661661</p> | <ul style="list-style-type: none"> • Should the project insist to undertake the study on the entire 646 hectares, its entire process must commence from stage one of the EIA application in accordance with the due process which includes but not limited to the followings; • Project Registration –The project has to purchase a screening form • The project consultant has to complete the screening form , submit with a project proposal |

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| | | | <ul style="list-style-type: none"> The agency will undertake a Groundthrotting exercise and make recommendation for the process subsequent stage(s) |
| Mohamed Abdulai Kamara | EPA-SL | 076661661 | <ul style="list-style-type: none"> Cannot make any contribution until they visit the site and collect data to determine the sensitivity of the project. |
| Ishmael Kamara | National Water Resource Management Agency | +23279319526 | <ul style="list-style-type: none"> Waste Management – the process of waste management and subsequent management has to be made clear for the agency to make informed input om the needed precautions and procedures Project Location – the GS coordinates for the project site should be shared with the agency. Licenses – the agency requires that PCA secure a license before abstraction of can be permitted. The process involves the picking of the necessary forms and paying the accompanying fees for administrative charges and site inspection. |

5.17 Grievance Redress Mechanism

The activities of the project may generate grievances arising from the interaction between project and local authorities/community, workers and the host community etc. Some potential grievances identified and likely to occur during project implementation include:

- Complaints related to noise, dust, traffic incidents; and
- Failure to consider the recruitment of local man-labour;
- Non-respect of the habits and customs of the host community by the actors of the site;
- Non-compliance with the measures or provisions contained in the ESMP
- Complaints from the local community on the conduct of workers, especially sexual harassment and other gender-based offenses;

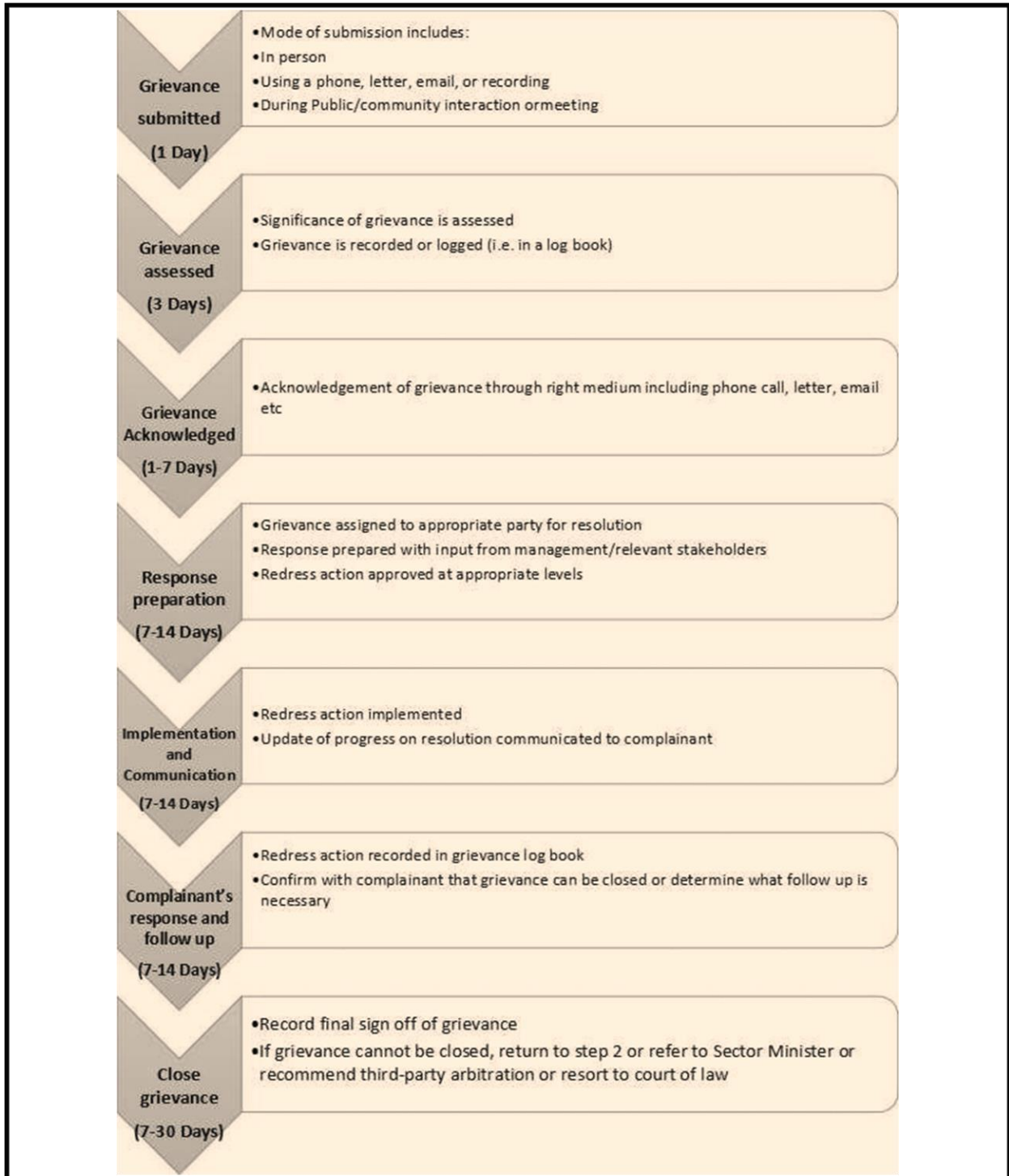
In managing grievances, PCA project will utilise PCA project existing Grievance Redress Mechanism.

- The PCA project Ltd will constantly engage project affected persons through its Stakeholder and Public Disclosure Plan. This will keep the communities informed of developments on the project, including planned activities, project impacts and mitigation measures, grievance mechanism, and the right to submit complaints.
- Building capacity of the Councillors to ensure they can engage the community members, record and ensure grievances are resolved.

Grievances are expected to be communicated either verbally (in a language of choice) or in writing to the GRC. Upon receipt of complaints, timely responses are expected to be given. It is expected that if grievances cannot be resolved locally, then these will be referred quickly to the Council GRC for resolution. Actions to be taken to address the grievance will be agreed upon by the GRC, and progress of implementation of agreed measures reported to the Local community and Council on a monthly basis.

A grievance management procedure indicating activities and timeframe for resolution of issues is shown in Figure 2 below.

Figure 2: Procedure for Grievance Redress



6.0 IMPACT ANALYSIS APPROACH AND METHODOLOGY

This chapter presents the methodology used to assess the significance of impacts that may result from the PCA project. It outlines general assessment methods and presents the criteria for determining receptor sensitivity, impact magnitude and impact significance.

Impact Assessment

The impact assessment for this study includes;

- Identification of Potential Environmental and Social Issues and Impacts;
- Evaluation and interpretation of impacts; and
- Impact Mitigation and Control.

Identification of Potential Environmental and Social Issues and Impacts

The potential environmental and social impacts of the existing PCA project and proposed project development have been identified and assessed as positive/beneficial or negative/adverse. The potential impacts of the Project have been identified and described for the various phases of the Project including impacts resulting from:

- Preparatory/planning phase activities;
- Construction phase activities;
- Operational phase activities; and
- Decommissioning phase activities.

Evaluation and Interpretation of Impacts

The significance of each impact has been evaluated and compared with national, international as well as applicable industry standards. The methodology for evaluating an impact is outlined below:

Impact Identification and Characterization

Impacts are described in terms of their characteristics, including the impact's type and the impact's spatial and temporal features (namely extent, duration, scale and frequency). The definitions of the terms used are described in Table 12 below.

Table 13: Impact Characteristics

| Characteristic | Definition | Terms |
|----------------|---|--|
| Type | A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect). | <p>Direct - Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., between occupation of a plot of land and the habitats which are affected).</p> <p>Indirect - Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).</p> <p>Induced - Impacts that result from other activities (which are not part of the Project) that happen because of the Project.</p> <p>Cumulative - Impacts that arise because of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect.</p> |
| Duration | The time period over which a resource / receptor is affected. | <p>Temporary - (period of less than 3 years - negligible/associated with the notion of reversibility)</p> <p>Short term - (period of less than 5 years i.e. production ramp up period)</p> <p>Long term - (period of more than 5 years and less than 15 years i.e. life of plant)</p> <p>Permanent - (a period that exceeds the life of plant – i.e. irreversible. Or may last for a very long time)</p> |
| Extent | The reach of the impact (i.e. physical distance an impact will extend to) | <p>On-site - impacts that are limited to the Project site.</p> <p>Local - impacts that are limited to the Project site and adjacent properties.</p> <p>Regional - impacts that are experienced at a regional scale, i.e. beyond adjacent properties, covering the metropolis and beyond</p> <p>National - impacts that are experienced at a national scale.</p> <p>Trans-boundary/International - impacts that are experienced outside of the country.</p> |
| Scale | Quantitative measure of the impact (e.g. the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.). or the professional viewpoint of the measure of impact | Quantitative measures as applicable for the feature or resources affects/ professional viewpoint of expert as applicable for the feature or resource in terms of severity of impact measure (i.e. minor, moderate, severe) |

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| Frequency | Measure of the constancy or periodicity of the impact. | No fixed designations; intended to be a numerical value or a qualitative description. |
| Likelihood | Characteristic that pertains to unplanned events determined either qualitatively or quantitatively estimated on the basis of experience and/or evidence that such an outcome has previously occurred. | <p>Unlikely – The event is unlikely but may occur at some time during normal operating conditions.</p> <p>Possible – The event is likely to occur at some time during normal operating conditions.</p> <p>Likely - The event will occur during normal operating conditions (i.e., it is essentially inevitable).</p> |

Determining Impact Magnitude

Once an impact's characteristics are defined, the next step in the impact assessment phase is to assign each impact a magnitude'. Magnitude is typically a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

1. extent;
2. duration;
3. scale; and
4. Frequency.

Magnitude (from small to large) is in practice a continuum, and evaluation along the spectrum requires the exercise of professional judgement and experience. Each impact is evaluated on a case-by-case basis, and the rationale for each determination is noted. The universal magnitude designations, for negative effects, are: negligible, small, medium and large.

The magnitude designations themselves, are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation has been assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a positive impact.

Determining Receptor Sensitivity

The other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors to be taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The sensitivity of receptor used is low, medium and high as shown in the table 13 below.

Table 14: Sensitivity Criteria

| Value / Sensitivity | Low | Medium | High |
|--|--|---|--|
| Biological and Species Value / Sensitivity Criteria | | | |
| Criteria | Not protected or listed as common / abundant; or not critical to other ecosystem functions (e.g. key prey species to other species). | Not protected or listed but may be a species common globally but rare in Sierra Leone with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline. | Specifically protect ed under Sierra Leone legislation and/or international conventions e.g. CITIES Listed as rare, threatened or endangered e.g. IUCN |
| Socio-Economic Sensitivity Criteria | | | |
| Criteria | Those affected are able to adapt with relative ease and maintain pre- impact status. | Able to adapt with some difficulty and maintain pre- impact status but only with a degree of support. | Those affected will not be able to adapt to changes and continue to maintain- pre impact status. |
| Criteria | The resource remains unaffected and maintains pre-impact status. | Pre-impact status is temporarily altered. May be restored over time naturally or through specific interventions. | Pre impact status is permanently altered by the development. Receptor or resource is held in high-esteem by stakeholders |

Assessing Significance

Once magnitude of impact and sensitivity of a receptor have been characterized, the significance can be determined for each impact.

Impact Minor Significance

An impact of minor significance, hereafter referred to as a 'minor impact' is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value. The repercussions on the environment are not significant and may or may not require the application of mitigation measures.

Moderate Significance

An impact of moderate significance hereafter referred to as a 'moderate impact', will be within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching an established (legal) limit. The repercussions on the environment are substantial but can be reduced through specific measures.

Major Significance

An impact of major significance, hereafter referred to as a 'major impact' is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. The repercussions on the environment are very strong and cannot easily be reduced.

Mitigation and Control

All significant impacts identified have been considered for mitigation and control through preventive, reductive/enhancement and curative strategies and control measures. Measures have been identified, described and recommendations incorporated into the proposed development to minimise or avoid the key impacts. Where the effectiveness of mitigation measures is uncertain, or depends on assumptions about operational procedures, monitoring programmes and/or operations/management procedures will define the required practice.

A provisional environmental management plan (PEMP) has been developed for the project and its facilities in accordance with the Environmental Protection Agency Regulations, 2010. An Environmental Monitoring Plan section of the PEMP presents detailed plans to monitor the implementation of mitigating measures and the identified impacts of the project during the construction and operation phases. The plan includes an estimate of capital and operating costs.

7.0 POTENTIAL IMPACT IDENTIFICATION AND ASSESSMENT

This Chapter provides an identification and evaluation of the environmental and social impacts of the PCA Project.

Environmental and Social Conditions and Potential Receptors

The following baseline conditions are described within the project area of influence:

- Geographical;
- Environment (physical and biological environment);
- Human/socioeconomic environment; and
- Institutional/organizational

7.1 Geographical area of influence

The immediate geographical area of influence includes the; Mathen and Rogbatha community which the proposed site for the pilot phase onion farm preparation and construction of ancillary project facilities which is within the PCA existing leased area. The immediate communities to be influenced are the Mathen, Forikolo and Rogberek communities in the Port Loko District.

7.1.1 Environmental media

The main environmental media to be impacted are ambient air and soil at the project site. The Mathen chiefdom ecology, the community source of water, could be a recipient of agrochemical water impact especially through runoff, erosion and sediment transport via runoff into water bodies during land preparation and operational phase activities could also adversely impact on water quality.

The ambient air quality will be influenced by dust emissions during the construction phase especially when excavations and construction activities are carried out in the dry season. Fumes and exhaust of equipment/machinery usage may also impact on ambient air quality.

7.1.2 Human and Socioeconomic Environment

The project pilot site boundary is about 50 metres to the nearest community, Rogbatha and is about 1 km from the Mathen community and 0.7 Km from Forikolo (human settlements). There is potential for disturbance of these communities. Vulnerable groups are those at risk of becoming more vulnerable due to impacts from project implementation. These vulnerable people include, but not limited to:

- disabled persons, whether mentally or physically challenged;
- the elderly, usually from 70 years and above;
- very sick and or physically weak individuals;
- people without formal land rights;
- female headed households; and
- children.

There is also a potential impact on local economy, including employment and petty business opportunities.

7.1.3 Institutional and organizational influence

There are many institutions which will share interest in the proposed project in various capacities including promotional, regulatory and monitoring purposes, and which must be adequately informed and engaged during the entire life of the project. These include:

- National Protected Area Authority
- Environmental Protection Agency of Sierra Leone;
- National Water Resource Management Agency;
- Sierra Leone Road Safety Authority; and
- Ministry of Agriculture and food security

7.1.4 Specific Project Activities of Environmental and Social Concern

The project activities are grouped into four phases as follows:

- a) Planning and preparatory phase;
- b) Land development and construction phase; and
- c) Farm operational and maintenance phase.
- d) Decommissioning phase activities

7.1.4.1 Planning and Preparatory Phase Activities

The preparatory phase is described by the following sets of activities to be carried out to execute the project, and which could impact on the biophysical and social environments:

- Acquisition of Lands and Regularization;
- Survey works and feasibility studies to determine the land area to be leased for cropping;
- Statutory permitting activities from the EPA and other authorized bodies for the project undertaking;
- Identification and liaison with local farmers for crop compensation;
- Sensitization and training of local farmers/communities;
- Hiring of onsite local Labour for the land development phase; and
- Communication with relevant stakeholders on project commencement.

7.1.4.2 Land Preparation and Construction Phase Activities

The major land preparation/constructional phase activities likely to impact on the biophysical and social environment include:

- Clearing of vegetation and stumping to prepare the land for farming;
- Site clearing to facilitate construction of farm office and ancillary facilities, machinery workshop, and irrigation system;
- Earth excavation
- Transportation and delivery of construction materials and equipment to the project site;
- Construction of fire belts and bunds;
- Disposal of construction spoil and waste in general; and;
- Decommissioning of work camps.

7.1.4.3 Farm Operational Phase Activities

The PCA farm operational activities that will potentially impact on the environment include:

- Ploughing of the fields;
- Delivery and Storage of Farming Inputs (seed, fertilizer, agro chemicals, etc.);
- Planting and growing of Onion and vegetables;
- Application of fertilizers and agrochemicals;
- Maintenance of Drainage channels;
- Harvesting of crops and processing;
- Fuel storage and use of lubricant on machinery
- Temporary storage of crop produce at the farm; and
- Transportation of crop produce to market.

7.1.4.4 Decommissioning Phase Activities

Decommissioning activities to potentially impact on the environment include dismantling of infrastructure and loss of jobs

7.2 Significance Potential Impacts Determination

The impact significance rating depended on:

- Impact magnitude;
- Sensitivity and value of the receptor;
- Compliance with relevant laws, regulations and standards;
- Concerns and views of stakeholders;
- Overall worker comfort; and
- Likelihood of an occurrence.

Additionally, the impacts significance has been determined based on:

- Area of influence: this is to determine whether the impact will affect the local environment or will extend to other regions;
- Duration/persistence of impact: whether it is temporal in nature or permanent; and
- Reversibility or otherwise: whether the impact is reversible or irreversible in nature.

Impact Rating

The impacts are rated according to the following categories:

- 1) An impact of Low Significance referred to as a 'Minor Impact' is one where an effect is experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value;
- 2) An impact of Medium Significance referred to as a 'Moderate Impact', is one which is within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching an established (legal) limit; and
- 3) An impact of High Significance referred to as a 'Major Impact' is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resources/receptors

7.3 EVALUATION OF POTENTIAL IMPACTS AT PREPARATORY STAGE

The significant environmental and social issues, which could arise from planning/preparatory phase activities include:

7.3.1 LAND DEVELOPMENT PHASE IMPACTS

7.3.1.1. Potential Positive Impacts

The significant positive impacts of the PCA project are outlined as follows:

- Employment Opportunities and Improved Local Economy
- Increased Onion/vegetables and other economic activities;
- Improvement in social services;
- Cultural empowerment and exchange; and
- Enhanced conservation awareness in the local community.

Employment Opportunities and Improved Local Economy

The project is expected to engage local people reaching about 50 persons during the land preparation and constructional phase as both skilled, semi-skilled and unskilled labour, the local community will be considered in the first instance before migrants. Women, will be recruited for short-term and long-term jobs. The current profile of the community would suggest that most of the youth would qualify for unskilled work. During the land development stage, they will therefore be encouraged to provide most of the casual labour. This is a positive impact of the project and will go to affect the local communities directly.

The regular monthly earnings of labourers and artisans during the land preparation period will boost family incomes and therefore the local economy. **The impact is regional and of major significance.**

Increased commerce and other economic development

The presence of workers will create an opportunity for food vendors, shop owners, Landlords and other business operators in the communities to make some income. The local economy will experience an increase in opportunities directly and indirectly through the cultivation, production of vegetables and processing. Growth in numbers and revenue will be experienced by Small, Medium and Micro-enterprises (SMMEs) including wholesalers, retailers, restaurants, supermarkets, hotels etc.

Overall, The Project provides great potential for long-term economic benefits, through the creation, and growth of income-generating activities in the local communities, to increased food security and reduction in poverty in the area. **The impact is regional and of major significance**

Improvement in social services

The influx of migrant workers and Bird watchers (tourists) destinations stimulates the improvement of social services such as construction of Residents/Guesthouse, electricity, and water supply to meet the standards of migrant workers and tourists. Also, tax revenue helps improve other public services like healthcare and education services, in addition to a community development action plan across the four community and beyond.

Cultural empowerment and exchange

Project location has the potential for attraction to (Onion/vegetable farmers and tourist) as a flagship onion/vegetable project in the country and seasonal bird watchers around the estuary.

Traditional communities often experience increased self-esteem as a result of outsiders' respectful interest i.e. migrant workers/visitors meeting locals and learning about their cultures. Also, community participation adds significant value to a sustainable farming development program as locals profit in enhancing their language and social skills and cultural knowledge of other places.

Enhanced conservation awareness in the local community

Most rural residents grow up in beautiful natural areas, yet many are unaware of the global significance of their natural and cultural resources until international nature promoters comes, who are often enthralled by the local areas and communities. As a result, local communities experience a growing sense of pride and appreciation, which often leads to increased conservation efforts. Many residents become motivated to protect their communities and alter their resource usage patterns.

7.3.2 POTENTIAL NEGATIVE IMPACTS

The potential adverse impacts are grouped under the following:

- a) Planning and preparatory phase;
- b) Construction and land development phase; and
- c) Farm operational and maintenance phase.
- d) Decommissioning phase activities

7.3.2.1 Land Preparatory and Construction Phase Potential Adverse Impacts

The preparatory/construction phase potential adverse impacts are provided in Table 14 below.

Table 15: Land Preparatory and Construction Phase Potential Adverse Impacts

| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|--|--|--|--------------|------------------|----------------|-----------------|
| <p><i>Social and environmental assessment and management systems</i></p> | <p>Impact from Survey Works</p> | <p>Movement of personnel and vehicles during site survey feasibility studies to determine the land area to be leased for cropping may result in destruction of flora.</p> <p>Disturbance (noise) may become a nuisance to fauna in their natural habitat.</p> <p>In addition, personnel involved in pre-constructional activities such as survey works may be exposed to injury and bites from dangerous reptiles and other animals such as snakes, scorpions, bees, among others. The implementation of standard operational and safety procedures by experienced surveyors will minimize the impact on flora and risk of injury.</p> | <p>Local</p> | <p>Temporary</p> | <p>Average</p> | <p>Moderate</p> |
| | <p>Occupational Health and Safety Issues</p> | <p>Occupational health and safety issues during construction include: x Exposure of workers to excessive noise, vibrations, and dust x Exposure to reptile</p> | <p>Local</p> | <p>Temporary</p> | <p>Strong</p> | <p>Major</p> |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|--------------------------------|---|--------|-----------|-----------|----------|
| | | | | | | |
| | Poor labour working conditions | <p>attacks and insect bites during land clearing; and x Accidents in the use and handling of equipment and machinery.</p> <p>The necessary measures will be put in place to forestall any accidents.</p> <p>Lack of employment contracts could lead to workers being paid rates below the stipulated national minimum wage or work under poor conditions.</p> | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|--|---|---|--------------|------------------|----------------|--------------|
| <p><i>Biodiversity conservation and sustainable natural resource management</i></p> | <p>Loss of Biodiversity (Flora and Fauna)</p> | <p>Land clearing will involve the removal of existing diverse vegetation for onion cultivation ridges/beds. Associated fauna that use the place as habitat will be disturbed causing them to move farther away from the proposed site. A study of the floral and faunal characteristics of the project area, carried out as part of the baseline study revealed that the vegetation type to be lost is common to the area but some plants of conservation concerns/Indigenous are of ecological concern. The development may also be phased over a reasonable time period to avoid extensive clearance of vegetation in a short period of time.</p> | <p>Local</p> | <p>Permanent</p> | <p>Average</p> | <p>Major</p> |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|------------------|--|--------|-----------|-----------|----------|
| | Soil erosion | <p>Exposure of Soil Surface to Erosion and Soil Stability</p> <p>Activities related to vegetation /land clearance and construction involving earthworks (excavation, stumping, ploughing) as well as site grading will result in the exposure and loosening of top soil, making it susceptible to erosion by wind and storm water/runoff from heavy rains. The soil can undergo a range of impacts including:</p> <ul style="list-style-type: none"> •Soil erosion and sediment release to land and water; •Soil mixing, compaction and topsoil loss and; •Increased risk of contamination from fuels/oils spills and waste. <p>Disturbance to soil cannot be avoided altogether and therefore it is important to manage the potential impacts such that the potential for mitigation and restoration is maximized. .</p> | Local | Permanent | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|--------------------------------|--|--------|-----------|-----------|----------|
| | Landscape and Visual Intrusion | <p>The removal of vegetation to prepare about 646 hectares of farm land for the project may change the local landscape and may aesthetically displease the community.</p> <p>Poor housekeeping practices at the site may also reduce the aesthetic value of the area. The project site is less than 1km from the nearest community and is surrounded by natural vegetation. It is expected that this will obscure construction activities from the view of passers-by.</p> <p>Additionally, the project is planned to be executed in phases.</p> | Local | Temporary | Average | Minor |
| | Air Quality Deterioration | <p>Emission of fumes/dust from transport of personnel and materials especially on untarred routes to project site</p> <p>Dust emission from clearance of vegetation, movement of heavy equipment and haulage trucks, and construction of work camp as well as tooting of horns will occur. These are expected to be intermittent and long-term. As a result, they would pose significant impact on communities. It is</p> | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|--|--|--------|-----------|-----------|----------|
| | | noted that dust levels are elevated in the area during the Harmattan periods. | | | | |
| | Impact on surface water and aquatic life | Water quality at the lowland could be affected by sediments carried on the PCA project site during intensive rain periods by runoffs via the cleared portion of the area for ploughing and levelling. Hence, its impacts on aquatic life | Local | Temporary | Average | Moderate |
| | Water Pollution | The project activities will adversely impact on nearby water bodies and aquatic life if contractor disposes waste into streams and water bodies | Local | Temporary | Weak | Major |
| | Noise Nuisance | Sources of noise will include movement of vehicles, operation of heavy equipment and movement of earthwork/construction materials during land preparation activities. Work would be restricted to day time which would minimize noise nuisance. Furthermore, the communities (the nearest sensitive receptor of noise) are located in less than 1km away from project (Pilot Phase) sites. The use of ear muffs by machine operators will reduce noise impact on their health. | Local | Temporary | Weak | Minor |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|-------------------------------|--|--------|-----------|-----------|----------|
| | Solid Waste Management Issues | <p>Various streams of waste are likely to be generated during the land preparation phase and these will have to be properly managed and disposed-off appropriately to prevent any threat to the environment especially, soil.</p> <p>The major wastes to be generated include:</p> <ul style="list-style-type: none"> • Cleared vegetation including trees/biomass. • The wastes will be collected and properly disposed of to avoid sanitation challenges and aesthetic issues. • domestic waste from work camps and residential camps (will include used polythene bags); • waste oil from construction equipment/machinery • Construction spoil including scrap or metal/plastic/wood pieces, cement chippings, excavated materials etc. | Local | Temporary | Average | Moderate |
| | Sanitation Problems | <ul style="list-style-type: none"> • Sanitation facilities are grossly lacking in the project area. Construction workers will require suitable sanitary facilities to avoid free range disposal of human waste. | Local | Temporary | Weak | Minor |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---|---|--|--------------|------------------|----------------|-----------------|
| | | <p>Facilities will include toilets, bath houses as well as potable water supply.</p> <ul style="list-style-type: none"> • Poor house-keeping at workplaces and improper disposal of waste/garbage of all forms will create sanitation problems in the project areas and communities. . | | | | |
| <p>Community health, safety and security</p> | <p>Securing Water Sources for the project</p> | <p>Water is key to the project and the main source of irrigation water is from the underground water source -borehole(s). The amount of water to be abstracted for irrigation will have minimal impact on the underground source. However, the quantity of water to be abstracted or required will also take into consideration low flow periods especially in April/May to ensure that downstream uses for vegetable farming and maintenance of aquatic ecosystem is not significantly disadvantaged.</p> | <p>Local</p> | <p>Permanent</p> | <p>Average</p> | <p>Moderate</p> |
| | <p>Public /Traffic Safety Issues</p> | <p>The current low traffic regime in a typical rural setting will give way to frequent movements of vehicles and heavy duty equipment such as bulldozers for vegetation clearance and levelling and tractors for land</p> | <p>Local</p> | <p>Permanent</p> | <p>Average</p> | <p>Moderate</p> |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|------------------------|--|--------|-----------|-----------|----------|
| | | <p>preparation of the farms, as well as during transportation of construction and planting materials to the Farm site. Appropriate measures will have to be put in place to regulate the movement of vehicles/ trucks on site to safeguard public safety.</p> | | | | |
| | Alteration of Land use | <p>The project will not necessarily result in land use changes since peasant farming is the main stay of the people. The project has made provision for local farmers especially its out-growers to participate in the project hence their farming activities will continue.</p> <p>Other land use activities may include few individuals involved in minor activities such as medicinal herb harvesters, art and craft. Thatched roof makers and rice farming and harvesting and seasonal fruit tree owners whose activities will not necessarily be affected by the project.</p> | Local | Temporary | Average | Moderate |
| | Gender based violence | Presence of workers and increase in incidents of rape, defilement and GBV | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---|--|---|--------|-----------|-----------|----------|
| | Public health issues | Pollution of local water bodies like streams/swamps will adversely affect the health of users | Local | Temporary | Weak | Minor |
| | | <p>Illicit sexual relations between workers and locals may bring about increase in sexually transmitted diseases including HIV/AIDs.</p> <p>Interactions between workers and locals could also lead to the spread of COVID-19.</p> | Local | Temporary | Weak | Moderate |
| | Security concerns | <p>Violent behaviour and confrontations between workers and locals.</p> <p>Workers who are deemed to be financially sound could be victims of theft and burglary</p> | Local | Temporary | Average | Moderate |
| <i>Land acquisition and involuntary resettlement</i> | Land Acquisition for Project Development | <p>Generally, issues with land acquisition poses a threat to the successful operation of projects.</p> <p>Land in the project area are family owned lands.</p> <p>PCA Limited shall ensure compliance with appropriate land acquisition procedures with the land owners for its</p> | Local | Temporary | Strong | Major |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|------------------------------------|---|--|--------|-----------|-----------|----------|
| | | 646 ha farm land to avoid any threats of land conflicts to the successful implementation of the project. The land acquisition for the project will not result in the displacement of persons. | | | | |
| | Impact on structures/ properties | The implementation of the project will not lead to the destruction of any temporary or permanent structure | - | - | - | - |
| | Impact on livelihoods | The project activities will impact on livelihoods of the landowners and host communities | Local | Permanent | Average | Moderate |
| | Swamp use and non-payment offset | The project activities will impact on the swamp conservation and regulation | Local | Permanent | Average | Major |
| Indigenous People | Invasion and alteration of indigenous way of life | The project activities will not affect indigenous people as there are none within the project area | - | - | - | - |
| Physical Cultural Resources | Impact on social and cultural structures | Majority of the workers will be locals who understand the local culture. | Little | Temporary | Weak | Minor |
| | Historical and Cultural Resources | The preparation of large tracts of land may affect culturally sensitive sites including streams and sacred groves. | Local | Permanent | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|-------------------------------|--|--------|----------|-----------|----------|
| | such as shrines or cemeteries | One cemetery and two sacred groves were identified on the project site (Rogbatha and Rogberah) and the terms and conditions for relocation has been enumerated and agreed upon. As such, there will be no adverse impact on these resources. | | | | |

7.4 Evaluation of Potential Impacts at Operational and Maintenance Phase

Impacts anticipated from the PCA farm operational phase include the following positive and negative/adverse impacts:

7.4.1 Positive Operational Phase Impacts

Direct positive impacts of the PCA Irrigation Onion and Rain-fed vegetable cultivation project include:

Increased Agricultural Production and Food Security

The implementation of the land development project will help increase agricultural production and will include an increase in onion crop productivity, expansion in crop areas, and an increase in cropping intensity, which will contribute directly to food security at national, regional and local levels. The impact is of major significance

Employment and Job Creation

The overall project development will create employment opportunities for the local communities, employing about 300 persons on the project and their livelihood conditions will improve. It is expected that, income of local farmers will be improved and wealth generated by producing and sale of high value vegetables, thereby reducing poverty. The impact will be of major significance and long term.

Improvement in Social Amenities

A major positive impact expected from the project is an improvement in facilities such as health care centre, schools, potable water supply, electricity and transportation (roads) for the communities within the project area. The project will therefore open up the area and make it an important onion and vegetable hub for the country. The impact is of major significance.

Increased Commercial Activity

The Project may catalyse further development in the region by presenting business opportunities to local and external entrepreneurs. Other services (transport, telecommunications etc) will be required to support the project and these may be provided by these entrepreneurs, who will create job opportunities and wealth for the locals and others beyond. The impact is moderate and regional in nature.

Improved Nutritional Status

It is likely that the nutritional status of the local communities will be improved and therefore will reflect on the general wellbeing of the people. The project is expected to improve income levels so that people can afford well balanced diets. The project will also give opportunity to farmers to grow various staples for home consumption and for the market. The impact is local and moderate.

Improvement in Gender Issues

Women play central role in the provision, management and safeguarding of water and food resources and will enjoy equitable access to the benefits of the project. It is expected that majority of women will be integrated into the project as outgrowers who will receive support and have access to improved extension services from its PCA farmer as well as taken on as unskilled labour during harvesting and marketing. It is expected that, they will participate fully in project activities and offer leadership roles and representatives of various (Farmers Based Organization) FBO groups. The PCA project is expected to have a positive impact on the social standing of women, reduce their work load, and enhance their marital rights as well as their access to income. The impact is local and of moderate significance.

The operation phase potential adverse impacts are provided in **Table 16**.

Table 16: Operation Phase Potential Adverse Impacts

| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---|---|---|--------------|------------------|---------------|--------------|
| <p><i>Social and environmental assessment and management systems</i></p> | <p>Occupational Health and Safety Issues of Farmers and Workers</p> | <p>The transport, storage, handling and application of agrochemicals and chemically treated seedlings during crop planting are major environmental and health concern.</p> <p>The use of appropriate PPEs and adherence to safety and operational procedures will reduce this impact.</p> <p>Machine operators will be exposed to noise, dust and vibrations especially without the use of appropriate PPEs.</p> <p>There is a risk of accidents and injury from the use of machinery and equipment if safety procedures are not followed, as well as from snake, insect, rodent or dog bites etc</p> | <p>Local</p> | <p>Temporary</p> | <p>Strong</p> | <p>Major</p> |
| | <p>Environmental and Social Threat</p> | <p>Environmental and social threats to the project which needs to be considered mainly is Bushfires /wildfires.</p> <p><u>Bushfires and other Emergency Situations</u></p> | <p>Local</p> | <p>Temporary</p> | <p>Strong</p> | <p>Major</p> |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|--------------------------------|--|--------|-----------|-----------|----------|
| | | <p>Human activities of bush/wild fires have become an annual ritual in the savannah ecological zones in the country.</p> <p>Bush fires become serious especially during the dry season from December to March and prior to the farming season in April and May, where it is mainly used as a means of land clearing especially of post-harvest husk of maize and rice left on fields. Uncontrolled bushfires may pose serious threat to life and property.</p> <p>Other emergency situations may arise from various activities within and outside of the farm. For example, natural disasters, wind, flood issues, vehicular accidents, power failures, etc. may have disastrous consequences if no emergency response plans are put in place. The losses could be higher and result in joblessness of the outgrowers and workers engaged if appropriate measures are not put in place</p> | | | | |
| | Poor labour working conditions | Lack of employment contracts could lead to workers being paid rates below the stipulated national minimum wage or work under poor conditions. | Local | Temporary | Average | Moderate |
| | Air Quality Deterioration | Emission of combustion by-products—including carbon dioxide (CO ₂), Sulphur dioxide (SO ₂), nitrogen oxide (NO _x), and particulate matter (PM) could result from poor practices such as use of open | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---|--|---|--------|-----------|-----------|----------|
| | | <p>burning for weed control and post-harvest treatments.</p> <p>Indiscriminate spraying of agrochemicals as well as burning of pesticide-treated agricultural wastes and by-products (e.g., pesticide containers) may also result in unintended emissions of persistent organic pollutants.</p> | | | | |
| | Impact of Fuel/Oil Handling and Spillage on Soil | <p>The project will generate waste oil from servicing of mechanical equipment which could contaminate soils if not properly managed.</p> <p>Fuel service points and mechanical workshops must be planned to ensure best practices and prevent oil spills.</p> <p>Proper containment need to be provided around fuel storage facilities to prevent oil spills from moving into drains or contaminating the soil.</p> | Local | Temporary | Average | Moderate |
| <i>Biodiversity conservation and sustainable natural resource management</i> | Destruction of vegetation | Site clearing will lead to the destruction of some species of trees of medicinal and economic values within the farm bush. | Local | Permanent | Average | Moderate |
| | Displacement of wildlife | Site clearing will disturb some wildlife/fauna that use the entire leased farm bush area as habitat. | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|--|--|--------|-----------|-----------|----------|
| | Soil Erosion and Soil Stability | <p>Secondary land preparation activities such as ploughing and harrowing tend to loosen the soil and make it more susceptible to erosion during heavy or continuous downpours.</p> <p>The project area experiences torrential rainfall during the rainy season and sheet erosion is a common phenomenon in the northern part of the country. Disturbance to soil cannot be avoided altogether and therefore it is important to manage the potential impacts such that the potential for mitigation and restoration is maximized.</p> | Local | Temporary | Average | Moderate |
| | Impact from the Use of Agrochemicals on Soil | <p>Insufficient or inappropriate knowledge for the use of agrochemicals and inorganic fertilizers, failure to recycle nutrients contained in crop residues and excessive use of poor-quality water may result in soil pollution and elevated levels of some soil nutrients.</p> <p>The continuous application of ammonium based inorganic fertilizers may result in soil acidification and failure to correct changes in soil pH could affect the ability of soil to support life.</p> <p>Nutrient depletion may occur through continuous cropping of the land without adequate replenishment of soil nutrients.</p> <p>Impact is local and may be long lasting even after the project ends.</p> | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|---|--|--------|-----------|-----------|----------|
| | Water Pollution | <p>Impact of agrochemicals on Surface Water Quality</p> <p>The swamps network is entangled within the concession. Due to the proximity, it is likely for surface water pollution to occur resulting from sediment runoff and agrochemical leaching from the crop fields</p> | Local | permanent | strong | Major |
| | Impact on Ground Water | <p>The application of Excessive fertilizers and pesticides on land may affect groundwater quality by infiltration and leaching.</p> <p>This will in turn have impact on the community water wells and potential for Bioaccumulation on swamp aquatic creatures.</p> | Local | Permanent | strong | Major |
| | Impact on Downstream water users/ aquatic ecosystem | <p>The amount of water to be abstracted for irrigation will have impact on the community water wells. .</p> | Local | Permanent | strong | Moderate |
| | Impacts of Spray drift/Biodiversity | <p>The use of agrochemicals may also result in significant reduction in the population of soil fauna.</p> <p>Non target impacts from the use of agrochemicals on biodiversity may result from indiscriminate application, spray drift and runoff.</p> <p>Accidental spillage of agrochemicals to the environment will affect the terrestrial fauna. Impact</p> | Local | Permanent | strong | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---|---|---|--------|-----------|-----------|----------|
| | | | | | | |
| | | is local but will last through the life span of the project and may have lasting effects of the soil. | | | | |
| <i>Community health, safety and security</i> | Community safety concerns | Increased traffic to and from the project site through communities and townships raises traffic/public safety concerns | Local | Temporary | Average | Moderate |
| | Natural disaster | Clearing of vast area of bush farm for onion farming will expose the entire area and community to wind gush and heavy flood with respect of the project location on a creek. This raises concern for the safety of the host communities and the sustainability of the project. Appropriate measures need to be put in place to mitigate this aspects. | Local | Permanent | strong | Moderate |
| | Demographic and Population Change Impacts | The local population may increase during harvesting and marketing of produce as a result of influx of migrants seeking jobs and market. Influx of people and human migration into project area may put stress on local amenities (including sanitary facilities) and resources such as drinking water, as well as disrupt the cohesion of small, stable communities, which can lead to an increase in criminal activities such as fraud, theft, armed | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|---|--|--------------|------------------|----------------|-----------------|
| | | <p>robbery, rape and other social ills and anti-social behaviour.</p> <p>Promiscuity may lead to the spread of Sexually Transmitted Infections (STIs) including HIV/AIDS. Migrant workers and increased incomes tend to encourage liberal sexual behaviour.</p> | | | | |
| | <p>Pest/rodent infestation and contamination of produce</p> | <p>Stored grains in warehouses are susceptible to attacks from insects and rodents if the necessary management practices and storage conditions for the produce are not followed. Improper postharvest management practices on the farm may introduce insects such as weevils in the grains prior to storage at the warehouse. Insects and rodents may feed on stored grains, resulting in losses in quantity and quality of produce and consequently investment losses which could be high.</p> <p>In addition to feeding on stored grains, rodents may also contaminate stored produce through their droppings, urine, hairs and may spread human diseases. This could have health implications for the public. The impact on health could be high and of regional extent.</p> | <p>Local</p> | <p>Temporary</p> | <p>Average</p> | <p>Moderate</p> |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|-----------------------|--|--------|-----------|-----------|----------|
| | Post-harvest losses | <p>Post-harvest losses may arise from pest/rodent and disease infestation and improper storage conditions which reduce the shelf life of produce. Improper storage conditions in the warehouse such as poor ventilation, poor housekeeping and leakages in the roof may lead to Mould development, disease infestation and increase risk of pest/rodent infestation. Improper drying of grains to the recommended moisture content for storage will reduce the shelf life and make it susceptible to disease infestation.</p> <p>Mould development, disease infestation and pest/rodent infestation may result in loss of quantity and quality of produce, reduced germination rate for seed grains, reduced nutritional value, and loss in market value and investment losses. Any infested produce will be permanently impacted and the investment losses to PCA Limited and outgrowers could be major</p> | Local | Temporary | Average | Major |
| | Gender based violence | Presence of workers and increase in incidents of rape, defilement and GBV | Local | Temporary | Average | Moderate |
| | Public health issues | Pollution of local water bodies with effluent from the project will adversely affect the health of users/locals | Local | Temporary | Weak | Minor |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|-------------------------------|---|--------|-----------|-----------|----------|
| | | <p>Social decadence and associated activities such as Illicit sexual relations between patrons/revellers and locals may bring about increase in sexually transmitted diseases including HIV/AIDs.</p> <p>Interactions may also lead to the spread of COVID-19</p> | Local | Temporary | Average | Moderate |
| | Public /Traffic Safety Issues | <p>The current low traffic regime in a typical rural setting will give way to frequent movements of various classes of vehicles and heavy duty equipment during harvesting and marketing of produce.</p> <p>Appropriate measures will have to be put in place to regulate the movement of both private and commercial vehicles/ trucks on site to safeguard public life and property.</p> | Local | Temporary | Average | Major |
| | Air pollution | <p>Emission of fumes/dust from transport of materials especially on untarred routes to project site can impose health challenges to the locals and workers, appropriate measures will need to be in place.</p> | Local | Temporary | Average | Minor |
| | Sanitation Issues | <p>Public health and hygiene may be threatened due to the large number of people to be employed on the project. This could be a significant impact if adequate measures are not put in place in terms of provision of toilet facilities, bathhouses, sewage</p> | Local | Temporary | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---------|--------------------------------------|---|--------|-----------|-----------|----------|
| | | <p>treatment and disposal, as well as adequate quantities and qualities of potable water supply.</p> <p>The project could lead to an increase in local community population during market times and this could put pressure on available sanitation and toilet facilities in the community and the site.</p> | | | | |
| | Waste Generation and Disposal Issues | <p>Farm produce waste such as crop residue will form the bulk of waste produced.</p> <p>Agrochemical containers and fertilizer bags, which are hazardous wastes, will also be generated during the farm operations and maintenance phase and will pose health hazards to the public and impact on the environment if not properly disposed.</p> <p>Other wastes to be generated include office waste (paper, drinking water sachets, etc.).</p> <p>Poor housekeeping by out grower farmers and workers engaged on nucleus farms may also generate waste such as used polythene bags, food wastes, water sachets and bottles, etc. Bushy areas and stagnant water in improperly covered trenches and empty containers may breed mosquitoes.</p> <p>The impact is of local extent, but may occur throughout the duration of the project if appropriate measures are not put in place. .</p> | Local | Permanent | Average | Moderate |

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| IFC- PS | Potential Impact | Sources of Impact | Extent | Duration | Intensity | Severity |
|---|--------------------------------------|--|--------|-----------|-----------|----------|
| | Security concerns | Theft and violent behaviour could be rife as influx of patrons/inspectors could make them easy targets | Local | Temporary | Average | Moderate |
| <i>Physical Cultural Resources</i> | Impact on social and cultural values | Influx of non-indigenous persons could dilute cultural values and lead to moral/social decadence | Local | Temporary | Average | Moderate |

8.0 Mitigation Measure



Table 16: Mitigation Measures Proposed for Anticipated Negative Impacts and Enhancement of Positive Impacts

| IFC-PS | POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS | RECEPTOR | PROJECT ACTIVITIES | PROPOSED MITIGATION MEASURES | RESPONSIBILITY |
|---|--|--|--|---------------------------------------|----------------|
| <i>Land Preparation/Construction and Operational phase</i> | | | | | |
| <i>Social and environmental assessment and management systems</i> | | | | | |
| Occupational health and safety issues | Workers/ farmers | <ul style="list-style-type: none"> • Site clearance and land preparation for farming. • Transportation of materials and equipment/handling of equipment • Construction, farmhouse, workshops, office facilities | <ul style="list-style-type: none"> • PCA Farms will engage well-trained and experienced contractors with requisite licenses for construction of farm house/office facilities • Provide all workers with signed contracts that are consistent with national labour laws • Provide welfare facilities such as potable drinking water, shades, restrooms etc. for workers. • PCA Farms will ensure that contractors have health & safety policy to guide their activities | Occupational health and safety issues | |

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| | | <ul style="list-style-type: none"> • Earth excavation for laying of pipelines. • Disposal of construction spoil and solid waste | <p>and ensure adherence to health and safety procedures.</p> <ul style="list-style-type: none"> • Only trained and competent workers should be allowed to carry out work, and must be well briefed on safe working procedures. • PCA Farms will ensure that the contractor provided and enforces the use of appropriate PPE including safety boots, ear muffs, coveralls, reflector jackets, etc. as well as appropriate equipment (right tool for right job) to prevent accidents and injury. • Mandatory and basic PPE must be worn. • Have accident and incident reporting form available to record accidents and near-misses • PCA Farms will ensure machinery and equipment hired are in good condition and the operators are well trained and experienced. • PCA Farms will ensure selected contractors have adequate training in first aid and first aid kits as well as provision of first aid for workers and labours on site to treat minor ailments, cuts/injuries, snake bites. Major cases will be referred to the nearest health centre | |
| Gender based violence | Female workers | Land preparation phase | <ul style="list-style-type: none"> • Insert clause in employee contracts requiring contractors them to cooperate with law enforcement agencies investigating cases of gender-based violence • A minimum requirement of female employment should be indicated in the human resource policy of facility manager/operator • Clauses prohibiting rape, defilement and other Gender based Violence as well as child | Farm Manager /Contractor |

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| | | | <p>and forced labour should be inserted into facility manager's contracts</p> <ul style="list-style-type: none"> • Contact numbers of representative on the Grievance Redress Committee and GBV Service Providers should be pasted around the facility • Discuss issues of Gender Based Violence at staff meetings • Display on site posters prohibiting sexual exploitation and harassment | |
| Air pollution | | <ul style="list-style-type: none"> • Onion site preparation and transportation of raw materials | <ul style="list-style-type: none"> • Discourage idling of engines to minimise emission of vehicular fumes | Farm Manager /Contractor |
| Water pollution | | <ul style="list-style-type: none"> • Construction and cement work | <ul style="list-style-type: none"> • Manage effluent properly to prevent it from entering and polluting nearby waterbodies. | |
| Land Acquisition/Regularisation | | <ul style="list-style-type: none"> • Land lease for project development | <ul style="list-style-type: none"> • Undertake full stakeholders consultation to disclose project intent • Identify chieftdom authorities concerned with land ownership and tenure • Identify land owners and engage them formally on clear pathway to lease and agree on cost and duration of project. • Implement a flexible time frame for land owners to consult with families within and outside of each community. • Engage with national institution with direct bearing to land regularization such as SLIEPA and other legal institutions. • Engage with National protected area Authority for off-set permit to work on protected area swamp based on their off-set program and to understand the fully the terms and condition. • Engage with ministry of fisheries and marine resources the focal government institution in charge of marine resources. | Proponent/ PCU |

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| | | | <ul style="list-style-type: none"> Engage with Ministry of Lands, country planning and housing to confirm current land lease period (22 years) as against the present lease agreement of PCA of 25 years. Engage with Ministry of Agriculture and land owners to collect inventory of existing economic trees that needs to be removed and the compensation rights before clearing of land. Undertake the due processes of the EIA license acquisition before undertaking any land clearing activities. Formalize all agreement for ease of reference. | |
| <p><i>Biodiversity conservation and sustainable natural resource management</i></p> | <p>Terrestrial environment, flora and fauna</p> | <ul style="list-style-type: none"> Site clearing and land preparation | <p>Vegetation clearance to be done in phases and limited to only areas to be developed at a particular time to:</p> <ul style="list-style-type: none"> Allow affected fauna migrate and seek refuge to nearby bushes; and Limit the scale and duration of exposure of bare soils to agents of erosion. Green belts /Buffer zones and corridors would be created between fields to reduce impact on fauna as well as for the promotion of soil stability Educate locals on the benefit of conservation of nature and unnecessary clearing of vegetation and cutting of trees should be discouraged within the area. | <p>Contractor</p> |

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| | Erosion of top soil and soil stability | Soil | <ul style="list-style-type: none"> • Vegetation clearance and land preparation • Movement of machinery during transportation of materials and equipment • Construction of warehouse, workshop, office and farmhouse facilities • Earth excavation for installation of irrigation pipes | <ul style="list-style-type: none"> • Limiting vegetation clearance to areas of the land to be developed at a particular time to reduce exposure of bare soil to agents of erosion. • Covering of piled sand for construction with tarpaulin. • Land preparation activities including ploughing and harrowing will be designed to slope gently along the gradient /contours of the land to reduce erosion in times of heavy water run-off. | Contractor/Farm Manager |
| | Impact on surface water and aquatic biodiversity | Surface water, aquatic biodiversity | <ul style="list-style-type: none"> • Ploughing • Ridge construction • Landscaping and changes to natural drainage channels | <ul style="list-style-type: none"> • Erosion control systems will be designed to check erosion to help control the transport of soil sediments through runoff water into water bodies downstream | Farm Manger/ESO |
| | Solid waste/ construction spoil management issues | Project site / land | <ul style="list-style-type: none"> • Site clearance and land preparation • Construction of, farm house, /offices | <ul style="list-style-type: none"> • Collection of usable biomass (tree) for use by community to reduce volume of waste. • Spreading of leaves and twigs and ploughing into soil or allowed to decompose to add organic matter. • Use of excavated material for backfilling and levelling where possible. • Excavated material which cannot be re-used will be collected and disposed at approved dump site by the Port Loko District Council • Provision of adequate litter bins for collection and disposal of plastic waste such as lubricant containers, drinking water sachets and polythene bags which will be regularly emptied at approved dump site. • PCA Farms will provide special bins for the collection of empty agrochemical bottles/containers. For all agrochemical containers, they will first be triple-washed | Farm Manager /Contractor |

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| | | | | <p>and punctured before being placed in the provided bins.</p> <ul style="list-style-type: none"> • Regular toolbox talk on waste management must be provided to operatives/workers at the facility. • Have SOPs for managing hazardous and non-hazardous waste | |
| | Community health, safety and security | | | | |
| | Public/Traffic safety issues | Local communities/ Workers/ general public | <ul style="list-style-type: none"> • Transporting of construction materials and equipment/movement of vehicles • Earth excavation (ridges, irrigation system installations and facility construction) | <p>PCA Project will ensure the contractor for land preparation will do the following:</p> <p>Use of regularly serviced and well maintained vehicles to prevent frequent breakdowns on the road.</p> <p>Adherence to traffic and road regulations including speed limits, pedestrian crossing, warning signs, flags etc.</p> <ul style="list-style-type: none"> • Open trenches along the trafficked access areas will not be left exposed longer than is necessary. • Community complaints handling arrangements would be instituted • Any accidents on the road involving trucks and humans or domestic animals would be investigated immediately and corrective actions taken to avert re-occurrence • Organize trainings on COVID-19 and STDs for the workers and the community to create awareness. • Provide female and male condoms in washrooms for workers and patrons. | Farm Manager /Contractor/ESO |

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| | | | | <ul style="list-style-type: none"> • Conduct daily temperature screening of workers and patrons. • Provide handwashing stations and sanitizers • Ensure workers and visitors adhere to all COVID-19 protocols including wearing of face mask and social distancing. • Encourage workers to get vaccinated. | |
| | Traffic safety | Local communities/ Workers/ general public | <ul style="list-style-type: none"> • Site clearance and land preparation for farming activities • Construction of farm house, workshop, warehouse , offices • Earth excavation for installation of irrigation system Disposal of construction spoil and waste | <ul style="list-style-type: none"> • Trained flagmen (to slow down traffic) or parking attendants must be used to ensure safety when vehicles are entering or leaving the facility. • Appropriate warning signs should be put in place to warn the public especially motorists. • Have accident and incident reporting form to record accidents and near-misses. | Farm Manager /Contractor/ESO |
| | Security concerns | Local communities/ Workers/ general public ocal communities/ Workers | <ul style="list-style-type: none"> • Site clearance and land preparation for farming activities • During operational phase activities | <ul style="list-style-type: none"> • Provide adequate security by liaising with Police to conduct regular patrols • Engage local youth to provide security at car parks • Sensitize local community on cultural tolerance and grievance mechanisms to prevent confrontations | Farm Manager /Contractor/ESO |
| | Sanitation issues and public health | Local communities/ Workers | <ul style="list-style-type: none"> • Site clearance and land preparation for farming activities • Construction of farm house, workshop, warehouse , offices | <ul style="list-style-type: none"> • PCA Project will ensure that there is provision and use of adequate waste bins to minimise indiscriminate disposal of solid waste including cans and bottles which could collect water and breed mosquitoes. These will be frequently be emptied at approved dump sites. | Farm Manager /Contractor |

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| | | | <ul style="list-style-type: none"> • Earth excavation for installation of irrigation system • Disposal of construction spoil and waste | <ul style="list-style-type: none"> • Construction waste including metal scraps, wood chippings, etc. will be collected on frequent basis and disposed at approved landfill site. • Trenches and excavations will be properly covered to prevent accidents and collection of stagnant water which could breed mosquitoes. • Construction of bio-fill toilet for use by workers to prevent “free-range” defecation and associated health problems. • Ensure good house-keeping at the farm area , office area, warehouse, workshop and at the farmhouse | |
| | Soil Erosion and Soil Stability | Soil | <ul style="list-style-type: none"> • Ploughing and harrowing of fields • Planting | <ul style="list-style-type: none"> • Land preparation activities including ploughing and harrowing will be designed to slope gently along the gradient /contours of the land to reduce erosion in times of heavy water run-off. • Minimum ploughing and tillage of soil will be employed to reduce the susceptibility of soil to erosion • Limit on the use of heavy machinery to designated area of PCA project and improve soil biological conditions around young tree seedlings. | Farm Manger/ESO |
| | Impact from Agrochemical use | Land / flora and fauna and Groundwater, Soil | <ul style="list-style-type: none"> • Fertilizer and agrochemical application | <ul style="list-style-type: none"> • PCA project will, preferentially, use selective pesticides with low environmental impact quotient (EIQ) where appropriate, rather than broad-spectrum products, to minimize impacts on non-target species • PCA project will explore the use of organic manure as practicable as possible to minimise the use of inorganic manure and | Farm Manger/ESO |

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| | | | | <p>improve soil biological conditions. As practicable as possible, mechanical weed control will be adopted to minimize the use of weedicides.</p> <ul style="list-style-type: none"> • The slashed weeds will be left on the farm as mulch which will also rot to improve soil organic matter. • PCA project will ensure that only EPA approved types of agro-chemicals, from licensed agrochemical shops, will be purchased and used. • PCA project will ensure that workers/farmers adhere to the limits and recommended dosage of application of fertilizers to farmland that would subsequently leach/seep into ground water. • PCA project will carry out a soil analysis to determine the chemical conditions of the soil at the onset of the farm and to know the recommended rates of application of various soil nutrients. This will help know the deficient soil nutrients and the right types and quantities of fertilizers to apply. • PCA project will conduct awareness campaign among communities on dangers of agro chemicals. • PCA project will ensure that ploughing is done along the contours of the land to reduce flooding in times of heavy run off so as to prevent direct seepage of saline water into ground water table. • Farmers/ workers will be trained by PCA project on efficient application of agrochemicals and thereby avoid unwanted impact on non-target species | |
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| | <p>Impact of Fuel/Oil Handling and Spillage on Soil</p> | <p>Soil/land</p> | <ul style="list-style-type: none"> • Fuel storage and use of lubricant on machinery • Management and disposal of waste oil | <ul style="list-style-type: none"> • Waste oil and used lubricants will be collected for reuse • Dirty oil will be disposed of properly and mostly; as recycled fuel to be sold off to interested agents like any EPASL licensed used engine Oil Company in Sierra Leone. • Oil/fuel filters as well as containers for fuel, grease, and other lubricants will be collected and properly disposed of through oil marketing companies. • PCA project will ensure all machinery and equipment is regularly maintained. • Personnel to handle agrochemicals will be well trained to ensure efficient application of the chemicals | <p>Farm Manger/ESO</p> |
| | <p>Impact on Groundwater</p> | <p>Ground water</p> | <ul style="list-style-type: none"> • Fertilizer application • construction waste water | <ul style="list-style-type: none"> • PCA project will ensure the use of agrochemicals including inorganic fertilizers, weedicides and pesticides will be reduced as much as possible. Where possible, mechanical weed control will be considered instead of the use of weedicides and the use of organic manure will be explored. • Adhere to the limits and recommended dosage of application of fertilizers to farmland that would subsequently leach/seep into ground water. | <p>Farm Manger/ESO</p> |

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| | <p>Impact on water catchment and volume of water due to abstraction (proposed Irrigation Planned Phase)</p> | <p>Surface water,</p> | <ul style="list-style-type: none"> Water abstraction for irrigation/pumping | <ul style="list-style-type: none"> Should the project water abstraction depends on surface acquirers and earth dams, it will have significant impact on the host community water quantity and this requires mitigation measures and must not be an option. Depending on the number of boreholes to be drilled on the 646 Ha to be exploited and final volume of water to be used par day, the quantity of water to be abstracted will not have considerable impact on the water quantity for the neighbouring communities and aquatic biodiversity hence requiring major mitigation measure. This should be studied in an ESMP to be prepared after 18 months of the start of the operation on the entire 646 Ha in line with the project descriptions and design plan for the entire farm Maintenance section, Pump house and mechanical Equipment storage facilities will be sited meters away from the swamps to prevent oil seepage into swamps Silt filters will be incorporated in the construction design to prevent silting through water during pumping and abstraction. | <p>Farm Manger/ESO</p> |
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| | | | | <ul style="list-style-type: none"> Irrigation system operators would be encouraged to monitor the volume of water required for effective irrigation so as to effectively manage water use for irrigation and reduce any excessive use of water | |
| | Pollution of downstream water sources/aquatic life | Surface water(tributaries of the SLRE) | <ul style="list-style-type: none"> Land preparation and maintenance Fertilizer and/ agrochemical application Materials management and storage Waste management | <ul style="list-style-type: none"> PCA project will ensure that the use of agrochemicals including inorganic fertilizers, weedicides and pesticides will be reduced as much as possible. Where possible, mechanical weed control will be considered instead of the use of weedicides and organic manure will be used instead of inorganic fertilizers. Erosion control measures such as contour ploughing along the contour of the land, and planting across the slope; use of mulch and zero or minimum tillage will be adopted to minimize erosion and sediment transport into the downstream water bodies. Irrigation of crops in fields will be controlled to prevent flooding and the transport of soil sediments through runoff water into water bodies downstream | Farm Manger/ESO |
| | Impact on soil (effect of salinization) | Soil | <ul style="list-style-type: none"> Irrigation of crops | <ul style="list-style-type: none"> Water quality analysis will be conducted on irrigation water to check chemical constituents such as NaNO3 before irrigating crops as well as constant flooding. Limit will be placed on the use of agrochemicals which may contain dissolved salts that will cause soil salinity and affect crops. Use of Organic compounds will be encouraged to improve soil fertility and crop yield. | |

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| | | | | <ul style="list-style-type: none"> Farmers will be educated on proper farm techniques such as allowing just about 20% of irrigation water to leach the soil of salt accumulates, drained and discharged through an appropriate drainage system. | |
| | Pest/rodent infestation and contamination of produce | Stored produce, PCA project , out-growers, general public | <ul style="list-style-type: none"> Storage of produce | <p>PCA project will adopt an integrated insect and rodent management system to control insects and rodent infestation in the warehouse. This will include:</p> <ul style="list-style-type: none"> Good housekeeping practices such as regular cleaning inside the warehouse and proper packing of produce for ease of inspection; Keeping the surroundings of the warehouse clean and free from weeds; Preventing insects and rodents from entering the warehouse by regularly inspecting all doors, walls, windows and roof for any openings and repairing them. Use of biological control, such as cats, to keep mice and other rodents from the warehouse; Use of rodent traps; and Chemical control/fumigation through the use of EPA approved agrochemicals to control pests and rodents. | |
| | Post-harvest losses | PCA project , outgrowers, | <ul style="list-style-type: none"> Harvesting of crop produce | <ul style="list-style-type: none"> PCA project will ensure harvested Onion are properly dried to about standard moisture content to make them suitable for storage. PCA project will ensure on-farm processing activities are properly supervised to reduce mechanical damage to onion and vegetables | |

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| | | | | <p>which increases their susceptibility to disease infestation.</p> <ul style="list-style-type: none"> • PCA project will provide proper cooling at the warehouse and regularly inspect the roof to ensure there are no openings for leakages. This is to prevent damp conditions and rain water from getting into the warehouse. • PCA project will stack bags of produce on pallets off the ground and away from walls to prevent any damp (moisture) from the floor and walls from reaching the produce. • PCA project will ensure the warehouse and the surrounding environment is always kept clean and free from weeds. • Bags of grains will be properly arranged on pallets and the pallets will be arranged in rows with adequate spacing in between to ensure ease of cleaning the warehouse and inspection of produce for rodents and insects. • PCA project will ensure new produce from the farm are not mixed with old produce in the warehouse by storing the new produce at a different section in the warehouse. • Any infested produce will be immediately removed by PCA project and destroyed to prevent infestation of other produce. • Chemical treatment/fumigation, by using EPA approved agrochemicals and FAO guidelines, will be used by PCA project to control pest/rodents and diseases where necessary. | |
| | Solid/Post – harvest waste disposal & | Project site / land | <ul style="list-style-type: none"> • Harvesting of crops and shelling | <ul style="list-style-type: none"> • PCA project will provide adequate litter bins and these will be placed at vantage points at the office area, warehouse, workshop and farmland area to minimize littering of the site by workers. | Farm Manger/ESO |

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| | <p>management issues</p> | | <ul style="list-style-type: none"> • Temporary Storage of crop produce at the Farm • Fertilizer and agrochemical application | <ul style="list-style-type: none"> • PCA project will provide separate labelled bins for collection of agrochemical containers, foil seals, lids and fertilizer sacks for return to the suppliers for recycling/proper disposal, as per FAO guidelines2 • Any unused dilute pesticide that cannot be applied to the crop—along with rinse water, and out of-date or no-longer approved pesticides—would be disposed of as a hazardous waste, as per FAO guidelines1. • Any unused dilute pesticide that cannot be applied to the crop—along with rinse water, and out of-date or no-longer approved pesticides—would be disposed of as a hazardous waste, as per FAO guidelines1. • Containers will be stored safely and securely under cover prior to their safe disposal; they will not be used for other purposes. • Farmers and workers will be educated on the dangers and health hazards of re-use of agrochemical containers. • Workers will be sensitized on the need to utilize the waste bins to be provided • Some of the biomass/crop residue will be left on the field and worked into the soil to | |
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| | | | | <p>serve as manure. This will add to organic content of the soil</p> <ul style="list-style-type: none"> • Burning of crop residue will be discouraged as it is harmful to soil microorganism and poses health hazard to nearby village from inhalation. | |
| | Sanitation Issues | Local communities/ Workers | <ul style="list-style-type: none"> • Marketing. | <ul style="list-style-type: none"> • A place of convenience will be provided at the site to discourage free-range defecation. • In addition, field workers will be encouraged to use places of convenience available at nearby communities after seeking the consent of the communities. Waste bins will be provided at appropriate and convenient places to minimise littering of the site. Wash rooms and changing rooms will also be provided for workers. | Farm Manager/ ESO/ Foremen |
| | Occupational health and safety issues (operation phase) | Farmers and workers | Transportation and movement of vehicles during harvesting and marketing Storage and handling of agrochemicals during crop planting | <ul style="list-style-type: none"> • PCA project will 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. • 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 will be avoided for operations. (Annex 3a and 3b) | |

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| | | | | <ul style="list-style-type: none"> • All pesticides listed in WHO Hazard Class II (moderately hazardous), will be avoided unless appropriate controls established with respect to the manufacture, procurement, or distribution and/or use of these chemicals are in place. These chemicals would not be accessible to personnel without proper training, equipment, and facilities in which to handle, store, apply, and dispose of these products properly. • PCA project will ensure that contractors have health & safety policy to guide their activities and enforcement. • PCA project will ensure the use of appropriate equipment (right tool for right job) to prevent accidents and injury. • Provision and use of appropriate PPE including safety boots, ear muffs, coveralls, reflector jackets, etc. and enforced their use • PCA project will ensure machinery and equipment hired are in good condition and the operators are well trained and experienced. • PCA project will ensure workers and farmers I have adequate training on safety and adherence to health and safety procedures to minimize accidents. | |
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| | | | | <ul style="list-style-type: none"> Workers will be trained and well equipped on first aid administration. First aid kits are on site to treat minor ailments. Major cases will be referred to the Nearest health centre | |
| Community health, safety and security | | | Community/Public safety concerns | <ul style="list-style-type: none"> Trained flagmen (to slow down traffic) or parking attendants must be used to ensure safety when vehicles are entering or leaving the facility. Appropriate warning signs should be put in place to warn the public especially motorists. Have accident and incident reporting form to record accidents and near-misses. | |
| | | | Public health issues | <ul style="list-style-type: none"> Organize trainings on COVID-19 and STDs for the workers and the community to create awareness. Provide female and male condoms in washrooms for workers and patrons. Conduct daily temperature screening of workers and patrons. Provide handwashing stations and sanitizers Ensure workers and visitors adhere to all COVID-19 protocols including wearing of face mask and social distancing. Encourage workers to get vaccinated. | |
| | | | Security concerns | <ul style="list-style-type: none"> Provide adequate security by liaising with Police to conduct regular patrols Engage local youth to provide security at car parks Sensitize local community on cultural tolerance and grievance mechanisms to prevent confrontations | |

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| | Public /Traffic Safety Issues | Local communities | <ul style="list-style-type: none"> • Harvesting of crops • Transportation of harvested crop (rice) /movement of vehicles; • Marketing of produce | <ul style="list-style-type: none"> • PCA project will ensure the use of regularly serviced and well maintained vehicles to prevent frequent breakdowns on the road. • Adherence to traffic and road regulations including mandatory speed limits of 10km/hr when moving through the human settlements, pedestrian crossing, warning signs, flags, speed ramps etc. • Reckless tooting of horns would be an offence within the settlements. • Community complaints handling arrangements would be instituted. • Any accidents on the road involving trucks and humans or domestic animals would be investigated immediately and corrective actions taken to avert reoccurrence | Farm Manager/ESO |
| | Emergency situations (Bush fires, Oil/chemical spill, flooding) | Local communities/Farmers/ farmlands | General project activities | <u>Buffer Zones/Fire Belts</u> <ul style="list-style-type: none"> • Buffer zones/fire belts will be created between the irrigation scheme and the surrounding areas to prevent possible threats resulting from bushfire from the surrounding communities/activities. • A well-demarcated boundary of about 2-m width will be provided. | Project Management/ESO/ Farm Manager/ SL-NFF |

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| | | | | <ul style="list-style-type: none"> • Fire response teams will be established and trained on site to detect emergency fire out breaks as well as to liaise with the Sierra Leone National Fire Force (SL-NNFS) to combat fire. • Sanitation on fields will be encouraged. Machines and harvesters will be cleaned of all oil leakages to reduce possibilities of catching fire especially in the dry season. • Farmers, workers and entire community will be educated on the dangers of setting fire into bushes and farm areas in a bid to manage post -harvest waste, as well as on prevention and combating bush fires. • Slash and burn, and burning of post-harvest waste will be discouraged. <p><u>Chemical handling</u></p> <ul style="list-style-type: none"> • Emergency shower will be installed at appropriate points for use in case of chemical contacts. The chemical storage facilities will be provided with well ventilation systems and also leakage detection devices. <p><u>Water logging/ flooding issues</u></p> | |
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| | | | | <ul style="list-style-type: none"> • Continuous heavy downpour could create pools and possible flooding in irrigation fields. Channels in between and within blocks will be enhanced and maintained by removing weeds and sediment so that pools of water can drained off or flow out of the fields | |
| | <p>Physical Cultural Resources</p> | | <p>Impact on social and cultural structures or values</p> | <ul style="list-style-type: none"> • A code of conduct for employees and patrons that establishes rules for respect of local norms and traditions should be adopted. • Ensure that internal and external complaints are dealt with speedily. Traditional authorities should be constantly engaged to ensure cordial relations between project and the local community. | <p>Farm Manager/ESO</p> |



9.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Environmental monitoring is an essential component of a post project review phase following environmental assessment. The monitoring of various environmental parameters will also help to confirm any predicted impact or otherwise made during the environmental impact assessment study. It will provide management with relevant data and information to any problems that may arise with specific solutions.

The major monitoring activities to be undertaken will comprise:

- Surface water monitoring;
- Waste management;
- Soil erosion;
- Nutrient application and soil fertility in general;
- Pesticide use and residues;
- Fire management;
- Waste management;
- Occupational health and safety;
- Pest/rodent infestation and contamination of produce;
- Post-harvest losses;
- Public complaints/grievances; and
- Public/community health and safety and efficiency of preventive measures.

A checklist for monitoring of the above mentioned environmental and social parameters should be prepared and submitted during the first three (3) Months of commissioning of the project.

9.1 Surface Water Monitoring

The water quality of the swamps locations sampled for baseline within each community would be monitored periodically by collection of water samples for analysis at a certified laboratory. The monitoring sites will include the same locations used for the baseline study. The analysis to be conducted will be on the following:

- Physicochemical;
- Bacteriological; and
- Pesticide residue.

Physicochemical and bacteriological analyses will be carried out quarterly and pesticide residue analysis conducted biannually. The major parameters to be monitored for each analysis are summarized in the Table 17 below.

Table 17. Propose Physicochemical and bacteriological parameters to be monitored

| Pesticide residue | Physicochemical | Bacteriological |
|----------------------------|--------------------------|------------------------|
| Alpha BHC | Colour | Total Coliforms |
| Beta BHC | Odour | Faecal Coliforms |
| Gamma BHC | Turbidity | |
| Delta BHC | Conductivity | |
| Heptachlor | Total Dissolved Solids | |
| Pesticide residue | Physicochemical | Bacteriological |
| Aldrin | Nitrate | |
| Heptachlor Epoxide | Phosphate | |
| Alpha-Endosulfan | Biological Oxygen Demand | |
| 4,4'-DDE | Chemical Oxygen Demand | |
| Dieldrin | Grease/Oil | |
| Endrin | | |
| Beta-Endosulfan | | |
| 4,4'-DDD | | |
| Endosulphan Sulfate | | |
| Endrin Aldehyde | | |
| 4,4'-DDT | | |
| Endrin Ketone | | |
| Methoxychlor | | |

Responsibility

PCA project will engage the services of a reputable specialist's environmental management consultancy firm to undertake the sampling and analyses at a certified Laboratory. The consultant will compile annual sampling results in a good reporting format to the Company. The information will be accessible to stakeholders like the EPA and the National Water Resources Management Agency (NWRMA).

9.2 Nutrient/Soil Fertility and other Soil Properties

A monitoring program will be developed to assess the changes in soil fertility and other soil properties. Soil analysis indicating nutrient deficiencies will be accessed and fertility improvements will be prescribed. The sampling sites will be such that it is a good representation of the project area studied. The first monitoring will be conducted prior to commencement of the project to inform on the soil fertility status and quality to determine appropriate fertilizer and/or manure fertilizer application rates (Done Already). Subsequent bi-annual monitoring will be carried out. It will be ensured that the monitoring sites coincide with that of the baseline.

Parameters to be monitored

- The parameters to be determined include:
- Gravel content;
- Sand, silt and clay content;
- Texture;
- pH;
- Organic carbon;
- Total nitrogen
- Total and available phosphorus
- Exchangeable bases like Ca, Mg, Na;
- Exchangeable acidity; and
- ECEC.

Responsibility

Annual monitoring will be carried out. It will be ensured that the monitoring sites coincide with that of the baseline. PCA project will engage the services of a Soil Scientist to undertake this assignment.

9.3 Soil Erosion/Erosion Risk

Soil erosion and its associated risk will be assessed annually based on topography and slope; ground cover; exposed and bare soil; evidence of sheet, gully, and/or rill erosion; and exposed plant roots.

Responsibility

The Farm Manager on daily basis through direct field observation to find out traces of such erosion. PCA project will occasionally engage the services of a Soil Scientist to undertake this assignment.

9.4 Agro-Chemical/Pesticide Use and Residue

Intensive use of agro-chemicals especially for the control of pests and diseases could lead to high pesticide residue levels on site soils and on harvested produce and result in public health hazards. The manufacturer's recommendation will be followed. The European fresh produce market for example, has tight regulatory controls on accepted levels of pesticide residues and a current version for any target export crop must be obtained and adhered to. The use of banned chemicals for pest control will not be countenanced. A shortlist of permitted agro-chemicals for conventional cultivation is presented in **this report**.

There will be strict enforcement to ensure adherence to the type, rate, period and manner of application of agro-chemicals. There will be strict observation of pre-harvest intervals and integrated crop management practices, including the determination of pest thresh holds, pest scouting, and use of pest traps, good farm sanitation and the avoidance of routine chemical spraying regimes. The farming system to be adopted will be certified to the Global Good Agricultural Practices Standard.

The Farm manager and Foremen will be responsible for monitoring the chemical application and general management of the farm

9.5 Waste Management

PCA project will design appropriate waste management procedures for the farm operations together with a Waste Management Consultant. The systems put in place to manage waste at the farm will be regularly monitored by the farm manager and ESO to ensure they are adequate and effective. The provision, use and appropriate disposal of waste will be monitored. The monitoring will include ensuring that farmers and workers use waste bins on site and do not indiscriminately dump waste at the farm, other plastic and polythene waste are not mixed with agrochemical containers and fertilizer sacks, and waste bins are dumped on time and not left on the farm when full. The handling and transportation of waste will also be monitored especially the use of appropriate PPEs when handling agrochemical containers and fertilizer sacks which are hazardous and ensuring they are returned to the suppliers for recycling/proper disposal.

Responsibility

The Farm Manager will be assisted by the ESO who will be responsible for monitoring waste management and reporting during management meetings. Where the waste management procedures put in place are found to be inadequate, measures will be put in place to address them.

9.6 Occupational Health and Safety

The health of construction workers and the rate of accidents/ incidents will be recorded and analysed with regard to the type of illness/ injury, frequency of illness/ injury, and the likely source of the sickness/ injury. Records will also be kept for the provision of PPEs, health and safety trainings conducted for farmers/workers and non-compliances. Annual health screening for all workers will be organized to know their health status. All workers will be registered with the National Health Insurance Scheme to aid workers in accessing prompt and timely medical care.

The monitoring of the health of workers and accident rate will confirm how effective workers use personal protective gears and equipment made available to them.

The Farm manager, ESO will be responsible for monitoring the health of workers. Workers health as well as accident records will be well documented

9.7 Fire Risks and Management

PCA project will implement an effective monitoring programme to reduce any fire risks on the farm, warehouse, and farm house and office areas. This will include ensuring fire belts are created at the onset of the dry season (usually October/November every year) and are maintained, ensuring installation and maintenance of fire detection, warning and fighting equipment at the warehouse/workshop/office and conducting training programmes for farmers/workers on fire prevention and control. Records will be kept on all fire occurrences and investigations conducted at all operational areas as well as organized training programs.

9.8 Contamination of Produce and Post-Harvest Losses

PCA project will monitor all post-harvest activities, including on-farm processing of harvested produce and storage in the warehouse to prevent pest/rodent infestation, contamination of produce and post-harvest losses. The monitoring will include conditions of the warehouse environment, ventilation at the warehouse, arrangement of produce in the warehouse and physical condition of stored produce. The Foreman will be responsible for monitoring of produce in the warehouse.

9.9 Community/Public Health and Safety

There is the risk of potential exposure to pesticides resulting from improper disposal of agrochemical containers and presence of pesticides or by-products in potentially harmful concentrations in foodstuffs and postharvest product which poses risk to community health and safety.

It will be ensured that guidelines for the transportation, storage, handling, usage, and disposal of hazardous products will be followed. The rate and frequency of accidents/ incidents will be recorded. The Farm manager, Foremen and Community Relations Officer will be responsible for monitoring the health of the general public. The health and safety issues of community and the general public will be well monitored and documented.

9.10 Public Complaints/Grievances

PCA project will monitor all complaints/grievances received from the public to effectively address them. Complaints/grievances can serve as an indication of growing stakeholder concerns. The Farm Manager shall be responsible for monitoring all public complaints/grievances received directly through him or through the Community Liaison Officer, Farm Manager and ESO. The Farm Manager/ESO shall have a log book for recording all the complaints/grievances received.

10.0 Monitoring Budget

Detailed cost analysis from prospective consultants and experts to be engaged as part of the monitoring program will be needed to confirm cost requirements. However, provisional budget to carry out the proposed monitoring program has been provided in Table 18.

Table 18: Environmental and Social Monitoring Plan with Costing

| IDENTIFIED ENVIRONMENTAL COMPONENT | PARAMETERS TO BE MONITORED | MONITORING SITE | MEASUREMENT (METHODS AND EQUIPMENT) | FREQUENCY OF MEASUREMENT | RESPONSIBILITY (REVIEW AND REPORTING) | COST ESTIMATE (\$) |
|---|---|-----------------------------------|---|--------------------------|---------------------------------------|--------------------|
| Environmental Monitoring | | | | | | |
| Surface Water quality | Physicochemical parameters -Bacteriological parameters -Pesticides residue | Swamp (upstream & downstream) | AWWA, APHA and WEF (20 th Edition) | Bi annually | Environmental Consultant | 4000 |
| Soil erosion | Ground cover; exposed and bare soil; evidence of sheet, gully, and/or rill erosion; and exposed plant roots | Project site(farmland) | Visual inspection | Continuous | Soil Expert | - Flagged |
| Nutrient/ Fertilizer application and soil fertility in general; | Gravel content; Sand, silt and clay content; Texture; pH; Organic carbon; Total nitrogen; Total and available phosphorus; Exchangeable bases like Ca, Mg, Na; Exchangeable acidity; and ECEC. | Within the project site(farmland) | -Indian Standards Method of Test for Soil -USDA Classification -INRA Method | Bi annually | Soil Expert | 6,000 |
| Pesticide /agrochemical usage | Purchase, use, storage, expiry date and disposal, Collection of MSDS. | Project site (farmland) | Farm inventory and analysis | Continuous | Farm manager/ accountant | - Flagged |
| Solid waste management | - Quantities of waste generated/frequencies -Provision and use of dust bins -Inspection of containers and segregation of waste - appropriate disposal of waste | Within the farm area | Waste Inventory | Continuous | Farm manager/ESO | 2,000 |

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| | | | | | | |
| Social/Economic/Safety Monitoring | | | | | | |
| Occupational health and safety | -checking the availability of PPEs -ensuring the proper use of PPEs and reporting non-conformances -Adherence to health and safety procedures -Records on non-conformances -frequency, type and source of illness/accident/injury | farm area | Health and safety inventory/auditing /review | Continuous | ESO/farm manager | 2,000 |
| Pest/rodent infestation and contamination of produce | -Cleanliness of storage area -Inspection records -Chemical control/ Fumigation records -Maintenance records | Warehouse | Observation/inventory /reporting | Continuous | Farm Manager/ESO | 1,000 |
| Total | | | | | | 15.000 |

11.0 PROVISIONAL ENVIRONMENTAL MANAGEMENT PLAN

A provisional Environmental Management Plan (EMP) is developed for the project in line with the Environmental Assessment Regulations section 24 and 25 of the 2008 Act and as amended in 2010, to ensure that the operations of the commercial farming project are carried out in an environmentally safe and sound manner. The provisional EMP provides an environmental budget and training programs to be implemented for staff responsible for the operation and maintenance of the project and its associated works.

11.1 Program to Meet Requirements

- The programs proposed to meet the mitigation measures as well as the monitoring programs will include:
- Establishment of an Environmental, Health and Safety Committee;
- Staff Information and Training;
- Awareness creation on Environmental and Social Safeguards
- Environmental Monitoring Programs;
- Emergency Preparedness and Response Planning – Occupational accidents, fires, floods, spillage, etc
- Environmental Audit and Reviews;
- Public Participation and;
- Grievance Redress Mechanism

Environmental Health and Safety Committee

PCA project will form an Environmental, Health and Safety committee comprising staff and all workers (Farm manager, supervisors, community liaison officer) to formulate policies and draw up programs to manage the environment from its various activities. To assure the commitment and support of management, the Project Farm Manager will head this committee. The functions of the committee will among other things include:

- Responsibility for implementing the environmental policies of the commercial farmer (PCA project);
- Work closely with supervisors to co-ordinate all activities with bearing on the environment and occupational health and safety of workers;
- Implementing the environmental permit conditions and mitigation, monitoring and management measures in the ESIA;
- Process and manage environmental and health data that will be generated with time to ensure easy appreciation and understanding by workers, the public and stakeholders;
- Liaise with and attend to complaints from the communities on all such matters of environmental concern arising from the operations of the scheme;
- Consult with Management to decide on the role of consultants/experts in assisting with preparation and implementation of the environmental management activities; and
- Undertake disciplinary action against recalcitrant staff

Environmental Health and Social Safeguards Officer

PCA project will employ an Environmental Officer who doubles as a safeguards officer to ensure the implementation of all environmental and social safeguard actions. The functions of the Environmental Officer will among other things include:

- Liaising with the Project Farm Manager who is head of the Environmental, Health and Safety (EHS) Committee to follow up on the implementation of environmental and social safeguard actions;
- Working closely with the Project Farm Manager, field officer and other supervisors to ensure as far as reasonable practical, environmental protection, safe and healthy conditions and safe acts at all workplaces;
- Implementing the environmental permit conditions and mitigation, monitoring and management measures in the ESIA;
- Contributing to new projects or additional works to ensure that environmental and safety concerns are included in the planning stage;
- Liaising with the EHS committee to organize periodic meetings on environmental safeguards and safety awareness for all groups of workers;
- Liaise with the EHS committee to affirm which environmental concerns or reporting could be handled in-house and which ones will require external assistance; and
- Keeping records of relevant environmental and safety data and processing them for stakeholder consumption as appropriate; and
- Maintaining a site environmental and safety incident and complaints log book.

Staff information and Training

- Management is aware that a well-informed and trained staff will contribute greatly towards environmental management through the judicious use of resources and the prevention of accidents that might damage equipment, personnel and the environment.
- The objective of the EMP will only be achieved if every worker/farmer is adequately informed on the impacts or effects of the activities or operations of the farming project on the environment in particular and on public/workers health and safety.
- The Project management will make available all operational manuals needed by staff/farmers and organize on the job training programs for staff where necessary to ensure the proper use and handling of agrochemicals and equipment.
- Training will also be organized for the EHS/safeguard officer on environmental safeguards implementation.

Awareness Creation on Environmental and Social Safeguards

PCA project will ensure that personnel to be engaged on the various project activities are educated and well sensitized on environmental and social safeguard issues arising from its operations and activities and how the negative impacts will be mitigated. This will be done through series of scheduled meetings, seminars and workshops.

11.2 Environmental Monitoring Programs

Monitoring programs will be developed for relevant parameters, which serve as indicators of pollution on environmental media like water and land. The monitoring program will fall in line with the residual impact monitoring program to be carried out during project implementation.

The EPA will monitor the environmental impacts of the project to ensure that the Agency's environmental guidelines are followed. The Agency may also attend site meetings during the construction phase of the Project where issues bothering on environment will be addressed.

Emergency Preparedness and Response Planning

An emergency response plan will be put in place to combat emergency situations such as risk of fire, flooding, chemical spill etc.

Environmental Audit and Reviews

The monitoring program will form the basis for effective environmental auditing and reviews. This will underpin the periodic update of the EMP of the commercial farming development by PCA project

Public Participation

The doors of PCA project during project preparation, land development and operational phases, through the Project Managers' Office as well as the Community Relation's Office will always be opened to the general public for complaints, suggestions and advice on environmental related issues.

Grievance redress mechanisms will be instituted, with a form been provided where individuals and groups will identify and indicate their concerns on the form which will be presented to the project Managers office through the community Relations Officer and the Foremen.

Grievance redress mechanisms will be instituted, with a form been provided where individuals and groups will identify and indicate their concerns on the form which will be presented to the project Managers office through the community Relations Officer and the Foremen.

11.2.1 Cost Estimate for Environmental Management

The environmental plans enumerated above require detailed cost analysis after project development to determine the budget needed for its implementation. Initial estimates for the environmental management program is Fifty Two Thousand USD (\$ 52,000.00) as summarized in Table 19 This figure is subject to review following confirmation from cost studies to be carried out after project development phase.

Table 19: Cost Estimate for Environmental Management

| No. | Program | Cost/year (\$) |
|-----|--|------------------|
| 1. | Environmental media monitoring (<i>see Table 18 for details</i>) | 20,000.00 |
| 2. | Environmental, Health and Safety Training Programmes | 5,000.00 |
| 3. | Waste disposal and sanitation | 7,000.00 |
| 4. | Occupational health and safety <ul style="list-style-type: none"> • Provision of PPE • Provision of fire-fighting equipment | 7,000.00 |
| 5. | Environmental Auditing and Reporting Annual environmental, health and safety audits Quarterly returns of Monitoring Reports to EPA (in line with article 31 of the T and C of the EIA license) Preparation of Annual Environmental Reports (in line with Article 31) Preparation of Environmental and Social Management Plan (in line with Article 31) | 10,000 |
| 6. | <u>Grievance Redress</u> Management and Stakeholder Meetings | 3,000 |
| 7. | Total | 52,000.00 |

12.0 DECOMMISSIONING PLAN

Decommissioning is an unlikely option. Onion is an annual crops and can be cultivated for as long as the necessary factors of soil nutrient, water availability, market availability etc. exist. The Onion crops complete their life cycle, from germination to the production of seed, within four (4) months, and then dies. The land could be used for the cultivation of more suitable crops as conditions demand.

In the unlikely event decommissioning is necessary, a decommissioning plan will, need to be fashioned out should it become necessary at any point in time.

Basis for Decommissioning Plan

In keeping with environmental regulations of the country including the Environmental Assessment Regulations of 2008 and as amended 2010, a reclamation or post project closure plan with time frame and cost estimates will be periodically discussed with the relevant regulatory authorities (the EPA, MAFFS and Port Loko Districts Authorities).

PCA project will also extensively consult all workers and inform them of its programme.

Potential Decommissioning Activities

The Company will dispose of or remove all movable properties, equipment and machinery and temporary structures from the site. These properties will either be sent to new or other project sites.

Waste generated will be disposed of at the District Authority's' approved waste dumpsites. Permanent or immovable buildings and structures will be left undamaged. The immovable structures will be handed over to the government – the District Authorities.

There will be removal and disposal of all metals by giving all scrap metals to dealers for recycling.

Financial Proposal for Decommissioning and Reclamation

Detailed analyses of costs will be carried out during the preparation of the actual decommission or closure plan to confirm the actual cost of the various activities.

13.0 CONCLUSION

PCA project is fully aware of its responsibility to sound environmental management practices, and also the need to operate in accordance with the Environmental Protection Agency Act 2008, and Environmental Assessment Regulations therein. In accordance with these laws, the major potential environmental and socio-economic issues and impacts associated with the proposed commercial Farming Project have been identified and duly assessed.

Mitigation and monitoring measures for the identified impacts have been proposed at the design, planning and implementation stages in order to reduce significant adverse effects to the barest minimum. The monitoring program will confirm the effectiveness of the proposed mitigation measures and these have been prepared and presented in a Provisional Environmental Management Plan (PEMP) in this report.

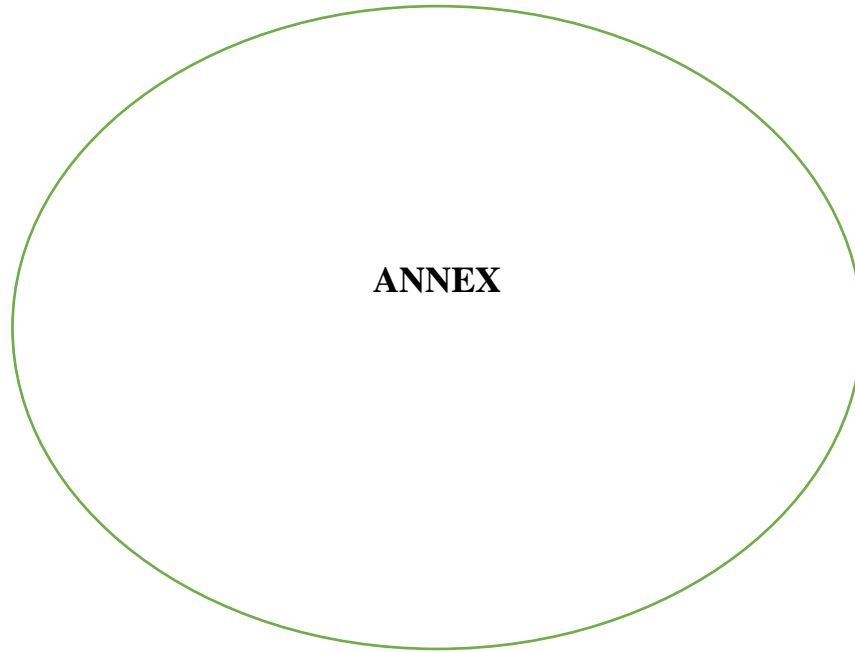
The implementation of the proposed project will improve the socio-economic life of the people in and around the, Lokomasama chiefdom, Port Loko District and its environs particularly the affected communities. The benefits to be derived from the project are immense. There will be employment opportunities for people who hitherto had insufficient source of income.

All stakeholders have therefore given their full commitment to help ensure that this project is implemented to the benefit of the people of the area, and the country as a whole.

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Annex 1; Outcome of Community Stakeholder’s Engagements and Assessment

| Name of person | Institution | Tel; contact | Comments , Views and Opinions |
|---|--------------------------|--------------|--|
| Anthony Toban Davies Bai Kamara Patrick James | Ecosys SL consultants | +23276970288 | <ul style="list-style-type: none"> • Introduced the purpose of calling the community members and land owners/ representatives to another stakeholder’s consultative meeting. Which was to disclose the proponent intents on the 646 Ha. • Mr. John the PCA agronomist was given the platform to present the proposed project plan for the entire 646 Ha. • The consultants highlighted the environmental and social aspect of the proposed project development and phase to the community members, then solicited for their inputs. The following comments, views and opinions were recorded; |
| John Lahai Allieu | Project Agronomist | 079685543 | <ul style="list-style-type: none"> • Gave detailed explanation about the project. • 50 acres of land will be used for the pilot phase. After harvesting the onions, another crop will be cultivated to make the land fertile • Optimistic that the project will expand because of available lands space • Mechanical farming will be used and irrigation system will also be used to increase productivity |

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| | | | <ul style="list-style-type: none"> • Opportunity will be given to the community to submit names of people to be employed but the management will scrutinized the list. • Informed the community that they will see government vehicle in the community and they will be hearing strange sound or noise from the machines when the operation starts. • Told the community that they should be expecting more people in their communities as consultants and expatriates would be coming into the farm site to monitor the farm. • The sustainability of the project depends on the community support and cooperation. <p><u>Responses on questions community asked</u></p> <ul style="list-style-type: none"> • Responded by saying that all employment issues will be channeled and handled by the community development committee (CDC). The company can only bring foreigners that have technical expertise which the community cannot provide. • The community will always be considered first in terms of employment. • For the youth to be employed on permanent basis, there is a need for them to focus on acquiring new and technical skills rather than focusing of on money making. • Clarifies to the community that some people will be employed on seasonal basis. That would be during the planting and harvesting periods more people will be |
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| | | | <p>employed. This means some people will be on contract basis while others will be on permanent basis.</p> <ul style="list-style-type: none"> • Also clarifies that the company will not sack any person without committing an offense. |
| Pa Alimamy Kamara Section Chief | Mathen Section | | <ul style="list-style-type: none"> • Briefed the community about the meeting and informed them further that, it is not a political gathering but rather a follow up on the previous community consultation about the Pee Cee Agriculture intent to implement the project on the entire land leased. • Expressed thanks and appreciation for such investment as they have been wishing for development in the section. |
| ConsultantS | Ecosys SL Limited | | <ul style="list-style-type: none"> • Land lords that leased the portion of lands occupied by PCA in Mathen section of Lokomasama were identified as follows; • Mathen: Two (2) families from Mathen (Kuku Bana and Forigbondia)respectively • Both families were present at the consultative session and attest to their families unanimously agreement to lease the land for a period of 25 years to the PCA. • These two family collectively have the least portion of land leased by the PCA. |

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| | | | <ul style="list-style-type: none">• The individual families agreed to have received payment for the land portion leased and documented.• Rogbatha and Rogbereh: These community jointly have the largest portion of land leased by the PCA.• These community agreed that they are one entity and governed by the same family tree as custodian of the land areas.• The Rogbatha community relocated to their present settlement but still remain as a family unit known as the Kamara.• Both members' community were present in large number.• Family (land owners) had a representative as an elected spokesman.• Other migrant residing in the community were also present.• They agreed to have received leased payment for the current year.• Crop assessment and evaluation for the plot phase was conducted in collaboration with the, the farmers, concerned, land owners the proponent and the delegates in charge of |
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| | | | <p>that department for crop evaluation in the Ministry of Agriculture and Food securities.</p> <ul style="list-style-type: none">• 71 persons were identified as farm owners on that portion of land, the farms size and crop values were evaluated and compensation payment agreed upon and payment was followed.• The present pilot phase activities commenced on Rogbatha land space.• Forikolo: the community of Forikolo owns the second largest portion leased by the PCA (project)• The entire community is controlled by a one family tree the Kamara as well.• The leased payment benefits the family members and non-family members residing in their community.• The family however, regards themselves as direct impact people in terms of land use change and hopefully will depend on the CSR and employment for their continual survival.• They attests that they unanimously leased their land space to the PCA project• They agreed to have received leased payment of \$20 USD/Ha for the current year. |
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| <p>Pa Alimamy Kamara Section Chief</p> | <p>Mathen Section</p> | | <ul style="list-style-type: none"> • Expressed willingness to support Pee Cee Agricultural project. • Encouraged the community people to raise their concerns and also to cooperate with the company. • Warned Pee Cee to stick to their promises because when they fail to fulfill their promises, the community will have no alternative but to ask them to leave and hand over the lands. • Mentioned that there is lack of social amenities (Road, education, poor health facilities and scholarships) in the chiefdom. • There is no light and safe drinking water in the community. <ul style="list-style-type: none"> – Women are always involved in the decision making process of the section/community. There is no cultural/traditional limitations to gender – The section has bye-laws for stealing and anyone caught will pay a fine of Le 500 and also pay cash for the value of the stolen property (ies). – In as much as there are bye-laws, he recommended that the company to bring its own security. |
| <p>Dickson Adikalie Kamara</p> | <p>Representative from Rogbatha village and Secretary of the development committee</p> | | <ul style="list-style-type: none"> • Four (4) villages came together and agreed to give their lands to Pee Cee Agriculture to invest. • The lands are owned by families of the four villages (Rogbereh, Rogbatha, Forikolo and Mathen) • The four villages have formed a development committee that will work directly with Pee Cee Agriculture as a link between the community and the |

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| | | | <p>company so that if there are any issues, those issues can be channelled and handled by the committee.</p> <ul style="list-style-type: none"> • Asked the management of Pee Cee Agriculture to recognize the committee. • The members of the committee where chosen by their people. Because of this, he appealed on behalf of his people for Pee Cee Agriculture to put the interest of the community first in terms of employment. The appeal does not in any way deny employment to people from other part of the country or against the Labour law of the country. • People from the four communities welcomed the project from the onset of contact and leased talk and still welcome the project. • During the time they were approached by Pee Cee Agriculture, the company and the land owning families agreed that 20% of the proceeds should be given to the families. • It was agreed that all the palm trees destroyed will be paid for and that was done. • The company promised to give employment opportunities to the village youths. • In terms of the importance of the land to the community, the community uses the land for farming purposes. |
| Yeabom Kamara (Female) | Forikolo | 030402766 | <ul style="list-style-type: none"> • The women were consulted during the land acquisition and compensation of crop exercise. |

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| | | | <ul style="list-style-type: none"> • Crop compensation was done accordingly • Women were promised of employment opportunities when the operation start. |
| Mohamed Ibrahim Kamara | Farmer and land representative from Forikolo | 030004651 | <ul style="list-style-type: none"> • Learned a lot from the meeting • He attest that land was leased out of good will and payment for land leased has been paid. • He added that the Forikolo community as land owners are expecting that the payment continues peacefully and timely as it is currently done and not on the contrary. |
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| Amara Mansaray | Mathen Village | 030467755 | <ul style="list-style-type: none"> • Over the years, our people have farmed on these portion of land leased, we expect that we project will assist the community to engage in some form of out growers benefits. • We also hope that we can benefit from crop compensation for palm tree fell. • Some members of the community have fruit tree by their houses and beyond, we would like to know if those trees will be removed and compensated should the farm land preparation includes those. • Despite the age of those trees, some do bear fruits by time which serves as some consumption or little income source for the harvesters. |
| Mohamed Ibrahim Kamara | Farmer and land representative from Forikolo | 030004651 | <ul style="list-style-type: none"> • The land were used for farming and the palm trees were used for palm oil • Some people are using the swamps as source of water for drinking and laundering. |

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| Dickson Adikalie Kamara | Representative from Rogbatha village and Secretary of the development committee | Dickson Adikalie Kamara | <ul style="list-style-type: none"> • People have sacrificed their lands and because of that, land owning families should always be considered as priority in the employment. • Major challenges in the Mathen section is employment. • If employment at the PCA is based on those that have skills, definitely community youth will not be employed therefore we appeal for skill transfer. • It is obvious that most of us are not used to mechanized gaining, therefore we appeal that such criteria should not be a hindrance to deny our youths the opportunity to gain meaningful employment. We appeal that training of the workers should be part of the projects sustainability plan so we hope to benefit from it. • We look forward to hear from the proponent about the job security plans they have in place. • The women in the community have years of experience in vegetable farming and I think that if they are gainfully employed they will take along their years of experience in addition to project training to serve the project better. |
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| | | | <ul style="list-style-type: none"> • Women are mostly involved in livelihood provision for their homes, the upland and swamps serves as a sustenance source for them in any little way, the fact of leasing the land for this important development will deprive them , therefore the project should make provision for those that can be employed and seek alternative livelihood sources for those directly impacted. |
| | | | <ul style="list-style-type: none"> • Three (3) schools, one medical center serving the entire eighteen (18) communities of Mathen section and one main access road. Issues of traffic and community safety was raised and the project was advised to consider road safety as part of project sustainability component. • Community have domestic animals that are reared at free range. Issues of toxicity with regards to pesticides and herbicides spray drift on grazing spots of those creatures. • Possible impacts of agro-chemical seepage and pollution of underground water sources which is the main sources of water supply during the dry season. |
| | | | <ul style="list-style-type: none"> • Project development will present health challenges if the agro-chemical wastes and other forms of solid and liquid wastes are not properly managed , the community will count on the management to handle their wastes professional • The community does not have a landfill sites so the management must be mindful of that also. |

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| | | | |
|--|--|--|---|
| | | | <ul style="list-style-type: none">• The communities agreed to lease the land base on the following:<ul style="list-style-type: none">– Provision of good roads– Support the schools in the four villages– Provision of safe drinking water– Create employment opportunities for the youths– Provide trainings for the youth on how to operate the machines. |
|--|--|--|---|


Annex 2: Floral Assessment

Vegetation Assessment the PCA Project Area

The vegetation of the project area was assessed within the territory (Upland and Swamp) of Mathen, Rogbatha and Rogbereh as well as Forikolo. The project area is found to be rich in plants of medicinal, timber, crafts and building pole but in very young stages. The impact of farming, timber logging, and search for fuel wood, art and craft materials as well as building poles needs has depleted the forest and continues to, trees of values identified were not more than 5 cm thick in size. The swamp have some plants that is used by the locals for roof thatches and plants for making weaving ropes. The table below present some of the plant species that are of conservation importance and some that are least common as classified by the IUCN.

Least common includes but not limited to; Blue Mistflower, *Chenopodium album*, *Corchoropsis tomentosa*, *Corymbia citriodora*, *Drypetes perreticulata*, *Epilobium ciliatum*, *Fumaria parviflora*, *Galium saxatile*, *Galeopsis tetrahit*, *Luzula sylvatica*, *Magnifera indica*


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| Local name of flora | Botanical name | Photo | Ecology | Socio-economic value |
|---------------------|------------------------|--|--|---|
| Raffia palm | (Raphia Farinifera) |  | Swamp land (Forokolo community swamp land) | Craft. Rope for building material. Thatch for roofing |
| | Anisophylla quangensis | | Swamp land | |

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| | | | | |
|--|------------------------|--|-------------------|--|
| | <p>Panicum maximum</p> |  | <p>Swamp land</p> | |
|--|------------------------|--|-------------------|--|

| | | | | |
|--|----------------------------|---|-------------------|--|
| | <p>Polystichum munitum</p> |  | <p>Swamp land</p> | |
|--|----------------------------|---|-------------------|--|

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| | | | | |
|--|---------------------------|---|--------------------|--|
| | <p>Funtumia Africanus</p> |  | <p>Terrestrial</p> | |
| | <p>Spondia Mumbai</p> |  | <p>Terrestrial</p> | |



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| | | | | |
|--|--------------------------|--|--------------------|--|
| <p>Pongui (mende)</p> | <p>Anthocleista Spp.</p> |  | <p>Terrestrial</p> | <p>Herbal cure for STDs, malaria</p> |
| <p>Ndawa (mende) Am-Bis -Temne</p> | <p>Parinari Excelsa</p> | | | <p>Red Timber .Fuel wood, Cough medicine</p> |



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| | | | | |
|---------------------|-------------------|--|-------------|--------------------------|
| | |  | | |
| Ka-Thema (Temne) | Chlorophora regia | | Terrestrial | Valuable Brown Timber |

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| | | | | |
|-----------------------------|------------------------------------|---|--------------------|--|
| | |  | | |
| <p>Am-Fori- (Temne)</p> | <p>Craterispermum Laurinum</p> |  | <p>Terrestrial</p> | <p>Herbal values. Used for making Dye. Used for ceiling in native houses.</p> |

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| | | | |
|---|----------------------------|---|--|
| <p>An- WANDA (Temne)</p> <p>Brumston (Krio)</p> | <p>Morinda germinate</p> |  | <p>Bitter malaria medicine and typhoid treatment</p> |
| <p>Kandi (Mende)</p> <p>Ka-Kants (Temne)</p> | <p>Anisophylla laurina</p> |  | <p>Used in folk medicine to treat malaria, dysentery, diabetes, toothache and various skin..</p> |

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| | | | | |
|-----------------------------|---------------------|---|--|---|
| | | | | |
| Mannii (Tola) An-GBA | Beilschmiedia |  | | Food values. Used in agro-forestry farm. Used in IVS catchment restoration |
| Ma-TEL (Temne) Port-Loko | Xylophia Aethiopica | | | Medicinal and food values |


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| | | | | |
|---------------------------------------|--|--|--|--|
| <p>Ma-POS (Yoni and Kunike Temne)</p> | |  | | |
|---------------------------------------|--|--|--|--|

Annex 3: Water quality test results and analysis

| | Roqbedna Village borehole Values | WHO recommended Permissible Limits |
|-----|-------------------------------------|---------------------------------------|
| 1. | Water Temperature (°C) | 29.0 No. Value |
| 2. | pH | 6.07 6.5-8.5 |
| 3. | Turbidity (NTU) | 0 <3.0 |
| 4. | Conductivity (µS/cm) | 12 <500 |
| 5. | Dissolved oxygen (mg/L) | 6.5 >6 |
| 6. | Ammonia (mg/l) | 0.09 No. Value |
| 7. | Copper (mg/l) | 0.14 <1.0 |
| 8. | Iron (mg/l) | 0.19 <0.3 |
| 9. | Nitrite (mg/l) | 0.005 3.0 |
| 10. | Nitrate (mg/l) HR | 0.20 <10 |
| 11. | Potassium (mg/l) | 0.35 <6.0 |
| 12. | Orthophosphate (mg/l) LK | 0.09 <0.055 |
| 13. | Sulphate (mg/l) | 6.4 <400 |
| 14. | Chloride (mg/l) | 6.1 <250 |
| 15. | Chromium | 0.03 <0.05 |

RECOMMENDATION/COMMENTS: Parameters tested for borehole sample in Roqbedna village met the WHO standards for drinking water except pH which can result from the geology of the area or through pollution, however it can be harmful for humans & plant and Orthophosphate that has no know health effect.




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Water Quality Testing Report Sheet

| | |
|---|---------------------------|
| Water Authority: National Water Resources Management Agency | |
| Name of Company: PC & Sons | |
| District: Port Loko | |
| Town: Lungi | Date: 10/11/2022 |
| Sample No: 1 | Type of Sources: Borehole |
| Time: 10:10am | |
| Eastings: 0964056 | Nothings: 0702352 |

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Water Quality Testing Report Sheet

Water Authority: National Water Resources Management Agency

Company's Name: PC & Sons

District: Port Loko

Town: Forikolo Village Date: 10/11/2022


Sample No: 3 Type of Sources: Hand dug well

Time: 1:35pm

Eastings: 0964858 Nothings: 0702004

| | | Forikolo Village Values | W/O recommended Permissible Limits |
|----|--------------------------|-------------------------|------------------------------------|
| 1 | Water Temperature (°C) | 31.4 | No. Value |
| 2 | pH | 6.59 | 6.5 – 8.5 |
| 3 | Turbidity (NTU) | 0 | <5.0 |
| 4 | Conductivity (µS/cm) | 144 | <500 |
| 5 | Dissolved oxygen (mg/L) | 12.6 | >6 |
| 6 | Ammonia (mg/l) | 0.07 | No. Value |
| 7 | Copper (mg/l) | 0.025 | <1.0 |
| 8 | Iron (mg/l) | 0.92 | <0.3 |
| 9 | Nitrite (mg/l) | 0.005 | 3.0 |
| 10 | Nitrate (mg/l) HR | 1 | <10 |
| 11 | Potassium (mg/l) | 4.5 | <6.0 |
| 12 | Orthophosphate (mg/l) LR | 0.66 | <0.035 |
| 13 | Sulphate (mg/l) | 2.5 | <400 |
| 14 | Chloride (mg/l) | 0.025 | <250 |
| 15 | Chromium | 0.01 | <0.05 |

RECOMMENDATION/COMMENTS: All parameters tested for the Forikolo village ground water sample met the WHO water quality standards for drinking water except for Orthophosphate result that falls below the standard. However, it does not have any known health effect.



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Water Quality Testing Report Sheet

Water Authority: National Water Resources Management Agency

Company's Name: PC & Sons

District: Port Loko

Town: Maten Village Date: 10/11/2022


Sample No: 6 Type of Sources: Borehole

Time: 3:20pm

Eastings: 0962009 Notings: 0703224



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Water Quality Testing Report Sheet

| | |
|---|------------------------------------|
| Water Authority: National Water Resources Management Agency | |
| Company's Name: PC & Sons | |
| District: Port Loko | |
| Town: Rogbatha Village | Date: 10/11/2022 |
| Sample No: 5 | Type of Sources: Swamp Down stream |
| Time: 2:15 pm | |
| Eastings: 0964858 | Nothings: 0702004 |


Egbe

| | | Rogbatha Village Swamp Downstream Values | WHO recommended Permissible Limits |
|-----|---------------------------------|---|------------------------------------|
| 1. | Water Temperature (°C) | 28.9 | No. Value |
| 2. | pH | 6.21 | 6.5 – 8.5 |
| 3. | Turbidity (NTU) | 13 | <5.0 |
| 4. | Conductivity (µS/cm) | 4 | <500 |
| 5. | Dissolved oxygen (mg/L) | 3.9 | >6 |
| 6. | TSS (mg/l) | 64 | <248 |
| 7. | Ammonia (mg/l) | 0.11 | No. Value |
| 8. | Copper (mg/l) | 0.20 | <1.0 |
| 9. | Iron (mg/l) | 0.15 | <0.3 |
| 10. | Nitrite (mg/l) | 0.006 | 3.0 |
| 11. | Nitrate (mg/l) <i>HR</i> | 0.13 | <10 |
| 12. | Potassium (mg/l) | 1.1 | <6.0 |
| 13. | Orthophosphate (mg/l) <i>LR</i> | 0.06 | <0.035 |
| 14. | Sulphate (mg/l) | 23.1 | <400 |
| 15. | Chloride (mg/l) | 2.5 | <250 |
| 16. | Chromium | 0.06 | <0.05 |

RECOMMENDATION/COMMENTS: Most of the parameters tested for swamp downstream sample in Rogbatha village met the WHO standards except for dissolve oxygen (DO), Orthophosphate (OP), pH, and Chromium. Low DO poses threat for aquatic life and this is caused by the rapid growth of algae resulting from the use of fertilizers (Phosphorus). OP on the other hand has no known health effect. Lower pH values are obtained mostly because of pollution or the geology of the area which in turn can be harmful to human and plants. High level of chromium (hexavalent) has adverse effect on human health and plants; however, it can be reduced using high-end water filtration systems.

Signed: 
(Hydro technician)

Date: 11/03/2023

Signed: 
Director

Date: 01/11/2022

