# ESIA for Rewilding Maforki Ltd Project in Bureh, Kasseh, Makonteh, Bekeh Lokoh and Kamasondo Chiefdoms in the Port Loko District of Sierra Leone

| DOCUMENT HISTORY | |
|---|---|
| **Title** | Environmental and Social Impact Assessment for Rewilding Maforki Ltd. project in Bureh, Kasseh, Makonteh, Bekeh Lokoh, and Kamasondo Chiefdoms in the Port Loko District of Sierra Leone |
| **Date** | Jan – Feb 2023 |
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| **Subject** | Environmental and Social Impact Assessment |
| **Publisher** | ECOWORLD (SL) LTD |
| **Type** | Client Report |
| **Client** | Rewilding Maforki Ltd |
| **Description** | Environmental and Social Impact Assessment |
| **Format** | Microsoft Word 2010 |
| **Source** | Text |
| **Rights** | ©ECOWORLD (SL) LTD |
| **Language** | English |
| **Coverage** | Port Loko District, Sierra Leone |

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## ACKNOWLEDGEMENT

We wish to extend our appreciation to various government of Sierra Leone (GOSL) ministries, departments, agencies, institutions, statutory bodies, organizations and individuals whose assistance, either directly or indirectly, made the Environmental and Social Impact Assessment (ESIA) for Rewilding Maforki rewilding and commercial forestry project in Bureh, Kasseh, Makonteh, Bekeh Lokoh and Kamasondo Chiefdoms in the Port Loko District of Sierra Leone possible. We are particularly grateful to the assistance availed to us by the Ministry of Agriculture and Forestry, Environment Protection Agency Sierra Leone (EPA-SL), the Port Loko District Council and the Ministry of Environment and its staff, especially for providing us with useful take off guidance to carry out the ESIA study.

We acknowledge the assistance and cooperation of staff of Rewilding Maforki who availed us relevant documents and information, to successfully carry out this study. We are thankful to the local authorities and members of the various communities visited around the project development area, for their diverse assistance during the main field visit. Last but not least, we would like to thank all those who, in one way or another contributed to making this ESIA study successful.

## PURPOSE OF THIS DOCUMENT

Rewilding Maforki is implementing a reforestation project with about 466ha established in Port Loko District, North-western Province, Sierra Leone. The Project proponent intends to scale these activities over 25,000 ha of land within the same district. Planting will take place over the next 6 years. The above activities are set to be registered under Verra as a carbon program for which Rewilding Maforki is partnering with Eco securities. Currently, 466 hectares have been planted in Maconteh and Kasseh chiefdoms since June 2022. In Maconteh, 266 ha have been established while 200 ha of the plantations have beenestablished in Kasseh.

An Environmental Impact Assessment (EIA) has been conducted by Ecoworld (SL) Ltd, an Independent Environmental and Engineering consulting firm, to evaluate and assess the potential social and environmental impacts that may occur as a result of the proposed development. The EIA has been conducted in accordance with statutory requirements of the Environmental Protection Agency Act of 2008 and its amendments. The proposal from Rewilding Maforki falls into the category of undertakings in the first schedule of the Act for which an EIA is required.

The Environmental Regulations make provision for the Environmental Protection Agency (the national environmental authority) to consider the various issues identified during the main assessment. Therefore, this Report and its contents serve the following purposes:

1. An introduction to the EIA that is to be undertaken for reforestation project in Bureh, Kasseh, Maconteh, Bekeh Loko and Kamasondo Chiefdoms all in the PortLoko District.
2. Description of the Regulatory framework for the Environmental Impact Assessment.
3. Desk studies
4. Description of the Rewilding Maforki project and its objectives.
5. Description of the stakeholder consultation process and identification of all issues raised by stakeholders.
6. The impact assessment methodology and impact assessment of the proposed project
7. Analysis of Alternatives to the project and its design
8. Mitigations
9. Conclusions and Recommendations

Stakeholders can comment on this main assessment Report in the following ways:

1. Written submissions to the Company, its Consultants and the Environmental Protection Agency.

2. Comment by Email and Telephone to all of the above.
3. Attend stakeholder meetings arranged by Rewilding Maforki Company Ltd and Ecoworld (SL) Ltd.

Having completed the Scoping assessment, the next stage of an EIA is the main impact Assessment Phase. This stage also examines the key environmental sensitivities in detail and the likely impacts of the proposed development on the environment and stakeholder interests. It is also during this stage that the Consultants are able to recommend mitigations to limit negative impacts; as well as make appropriate recommendations for adoption by the project proponents.

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## Executive Summary

Rewilding Maforki Ltd (RML) is implementing a reforestation project with about 466ha established in Port Loko District, North-western Province, Sierra Leone. Rewilding intends to scale these activities over 25,000 ha of land within the same district. Planting will takeplace over the next 6 years. The above activities are set to be registered under Verra as a carbonprogram for which Rewilding Maforki Ltd is partnering with Ecosecurities.

RML plans to invest huge amount of money over the next 10yrs to achieve its planting objectives. Subject to planting objectives being met, the estimated financial benefits; accruable to local stakeholders, is very high. This will have positive impacts in the affected communities in the form of restoration of degraded areas, forest fire management support, localemployment, skills development and capacity building, improved incomes for workers, increased spending in the local economy, substantial financial benefits for local and institutional stakeholders, climate change mitigation, support for development of good social causes, close stakeholder collaboration, integration with local and regional development and supporting health and sanitation initiatives.

However, in any project of this nature, there are likely to be some negative environmental and social consequences which require detailed study. Therefore, in undertaking the impact assessment, the Consultants undertook desk and field studies pertaining to legal frameworks and relevant national policies, soils, topography, geology, hydrology and aquatic life, climate, rainfall, noise, air quality, vegetation, fauna and flora of the land allocated to the company. Field visits to the allocated compartments and testing of soil and water samples were undertaken to assess the suitability and impact on soils and water from the project. This provided the consultants with certain baseline information and parameters by which an impact assessment could be undertaken. The company's operational plans were also reviewed and stakeholder consultations were undertaken to identify areas of interest and concern and how they would be impacted by the project and its objectives. Key mitigations were then prescribed for soils, hydrology, land clearing, soil preparation, use of agro-chemicals, control of illegal settler farmers and management of stakeholder interests and are subsequently described.

In line with the company key project activities, the following impacts were identified:

**Nursery**

- Impact on groundwater

**Landscape Planning**

- Impact on Land use
- Impact on harvesting plans and landscape visual aesthetics
- Impact of poorly managed Rewilding Maforki on landscape

**Creation of Special Management Zones** (*Cliff edges and Rocky outcrops, wetland and riparian strips, archaeological/cultural sites, indigenous species and forests, conservation areas)*

- Impact on Protection of biodiversity rich and unique habitats
- Impact on Protection of indigenous natural forest species
- Impact on Reduction of wetland water levels by trees with high water absorption rates
- Impact on Protection of cultural and archaeological sites

**Site and Species matching**

- Impact on Soil nutrients
- Impact on changes to soil physical properties
- Impact on micro-climate conditions
- Impact of colonization by invasive species
- Impact on food sources for fauna

**Road construction and maintenance**

- Impact on soil erosion
- Impact on surface run off
- Impact on impoundment of streams
- Impact on quality of water bodies
- Impact on noise pollution
- Impact on air quality
- Impact on vegetation
- Impact on access to plantation

**Land Clearing**

- Impact on vegetation and canopy cover
- Impact on fauna habitats
- Impact on biodiversity
- Impact on soil erosion

- Impact on recharge of aquifers
- Impact on soil nutrients
- Impact of material transport into water-bodies
- Impact on illegal plantain and maize farms
- Impact on livelihoods of illegal and migrant farmers

**Soil Preparation**

- Impact on Soil nutrient enhancement/degradation from use of chemicals
- Impact on Soil erosion
- Impact of sedimentation on nearby water bodies

**Slash Management**

- Impact of Slow release of nutrients into soils
- Impact on soil moisture
- Impact of smoke inhalation by workers and surrounding settlements
- Impact on fire ignition and spread
- Impact on Soils

**Planting of trees**

- Impact on the development of micro climates
- Impact on alteration of reserve landscape
- Impact on employment and sub-contracting of farmers
- Impact on Inter-cropping by local farmers

**Use of agro-chemicals**

- Impact on soils, water bodies and aquatic life
- Impact on eutrophication
- Impact on health and safety of workers
- Impact on wildlife population

**Thinning and Maintenance of Tree Stands**

- Impact of fire risk from dry fuel matter
- Impact on soil compaction and erosion
- Impact on sedimentation run-off into water bodies

**Harvesting and Felling**

- Impact on corridors used by fauna
- Impact on flora

- Impact on soil compaction and erosion
- Impact of dispersal of dust from use of roads
- Impact on landscape aesthetics
- Impact of increased fire risk from dry fuel matter (twigs, leaves, branches, bark etc)

**Forest Fire Management**

- Protection of potential stakeholder revenues from forest outputs
- Protection of worker's livelihoods
- Health of the local communities
- Support regeneration of the reserve
- Protection of wildlife habitats and fauna

**Labour and Staff recruitment**

- Impact on employment
- Impact on income generation for workers
- Impact on gender balance in employment

**Stool Stakeholder Interests**

- Monitoring and Management of the Reserve
- Revenue earning streams from forest outputs for stool landowners
- Distribution of financial benefits amongst 3 stool land owners
- Employment and well being of young people
- Training and skills development of local populace
- Development of a vocational training centre
- Poverty alleviation
- Health and welfare

**Squatter Farmers and Herdsmen Interests**

- Farming and Cattle Grazing
- Permission for Inter-cropping on reserve lands

**Forestry Services Division**

- Reforestation of the reserve to meet landowner and local aspirations.
- Management and Monitoring of the forestry plantation.
- Uncontrolled spread of illegal settlers entering the plantation.
- Management and Control of Fire

**Wildlife Division of Forestry Commission**

- Spread of Uncontrolled Farm Fires
- Impact of Agrochemicals and Spent Oils Discharged on Fauna

**Water Resources Commission**

- Establishment of Buffer and Riparian Strips
- Controlled Use of Chemicals and Monitoring
- Controlled Use of Water Systems
- Surface and Underground Water Pollution
- Underground Water Re-charge

**Port Loko District Council**

- Creating Employment Opportunities
- Integration with regional and local development plans.

Mitigations measures for the above impact were provided. Stakeholder discussions have revealed general support for the Rewilding Maforki Ltd Project; Key areas of concern and interest center on theneed for effective management and monitoring of the plantation, controlling the spread of illegal herders and farmers in the plantation, limiting forest fires, limiting poaching of game, preventing damming of water courses for irrigation, controlling the use of agro-chemicals, establishment of buffer and riparian strips near water bodies, controlling use of water resources, creation of employment, support for the establishment of a vocational training center, skills development andcapacity building, providing scholarships and educational grants etc.

Following our overall assessment of the proposed project, it is our submission that Rewilding Maforki Project has the capability and the required technical and financial resources to undertake this project in a professional manner; taking into account the socio-economic needs of the local populace and implementing the necessary mitigations for limiting any negative effects on the environment. Nevertheless, this cannot be achieved by the company single handed; and therefore requires the active participation and contribution of both local and institutional stakeholders to

support the realization of project objectives that will bring significant benefits to the affected communities and its surrounding communities.

# CHAPTER 1.0: BACKGROUND/INTRODUCTION

## Background

Rewilding Maforki Ltd is implementing a reforestation with about 466ha established in Port Loko District, North-western Province, Sierra Leone. Rewilding intends to scale these activities over 25,000 ha of land within the same district. Planting will takeplace over the next 6 years. The above activities are set to be registered under Verra as a carbonprogram for which Rewilding Maforki is partnering with Ecosecurities. The project intends to plant a total of 19,800 hectares (ha) for rewilding and 5,200 ha for commercial purposes. Currently, 466 hectares have been planted in Maconteh and Kasseh chiefdoms since June 2022. In Maconteh, 266 ha have been established while 200 ha of the plantations have been establishedin Kasseh.

### *Rewilding*

Species planted are *Terminalia Superba, Terminalis ivorensis* and *Nauclea diderrichii* in the rewilding sections. The trees are spaced at 4 metres by 4 metres due to the high biomass accumulation of the native species. *Terminalia superba, Terminalis ivorensis* and *Nauclea diderrichii* have been planted in the already established plantations in Maconteh and Kasseh over 232 ha. Ideally, for a successful rewilding project, more than five species are required to be planted in an area. A detailed planting plan including the exact species for the rewilding is yet to be availed. For a restoration project, only native species should be planted, adaptive to the local agro-ecological zone, in a proper mix that mimics natural conditions. This information is key for comprehensive carbon estimations. Rewilding Maforki seeks to establish its own tree nurseries to sustain the supply of the quantity required from 2023 with the support of Njala Seed Bank as well as improve the diversity of the rewilding zones.

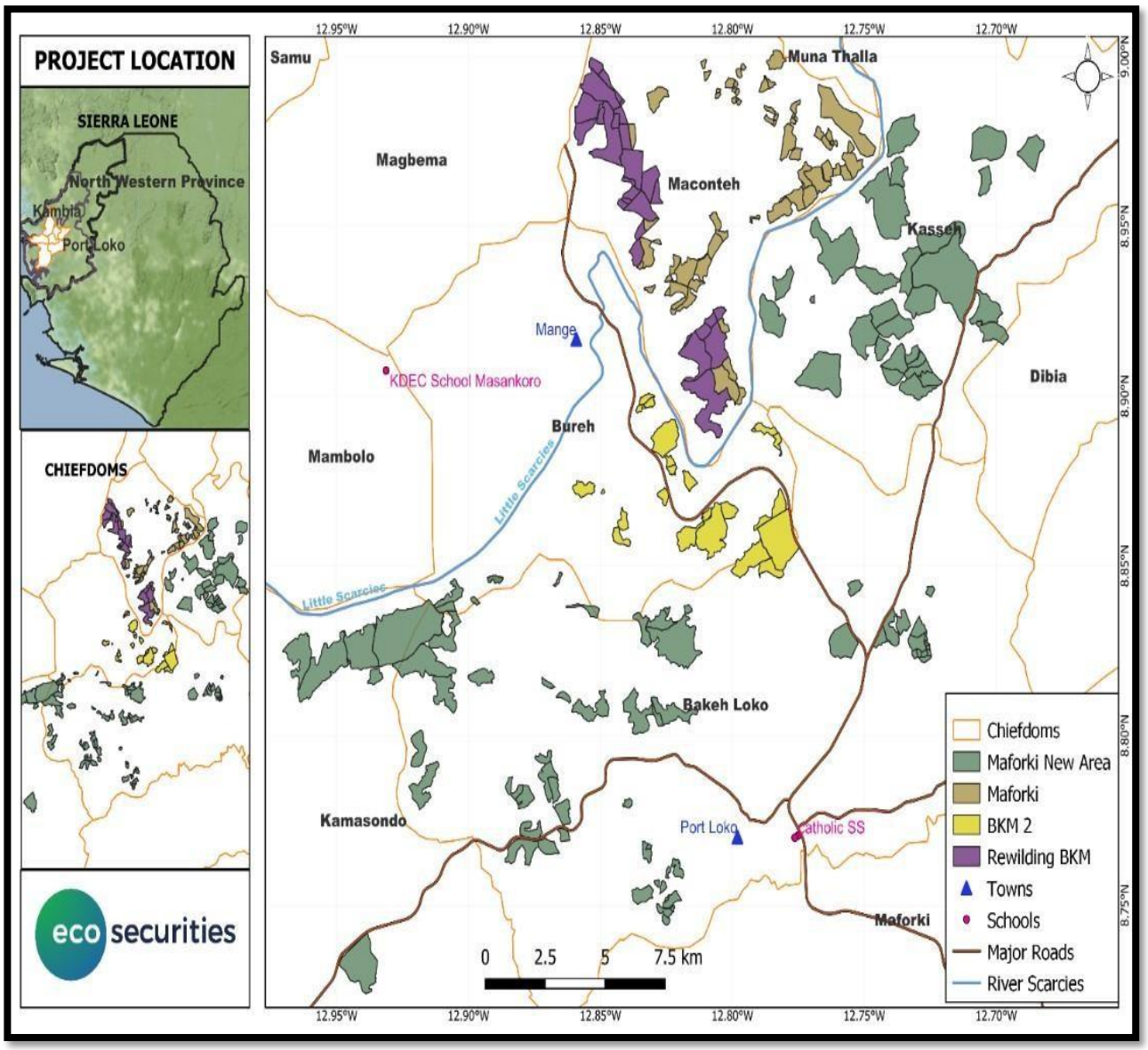



Figure 1.1: Map showing the project location

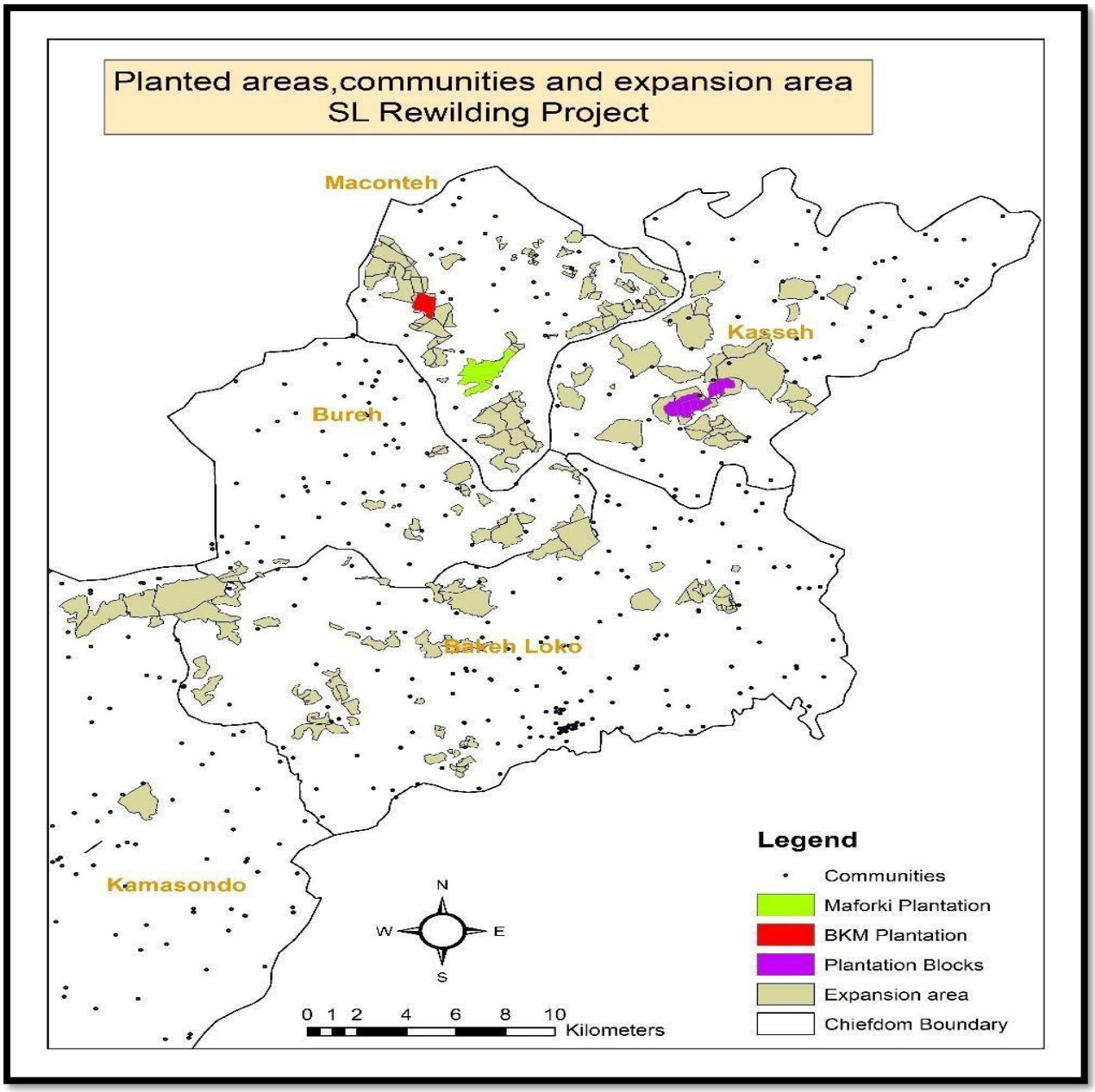



Figure 1.2. Map showing the planted areas, communities, chiefdoms and project expansion area.

The proposed development will involve nursing of seedlings, land preparation, creation of conservation management areas, planting of fast growing tree species, upgrading and maintenance of old logging roads, sustainable selective harvesting, creation of employment opportunities for locals in the development of modern agro-forestry initiatives, help in mitigating climate change impacts, collaboration with key stakeholders to support local good causes and distribution of financial benefits from plantation outputs for stakeholders.

However, in any project of this nature, there are likely to be some negative environmental and social consequences which require detailed study. Therefore, in undertaking the impact assessment, the Consultants undertook desk and field studies pertaining to legal frameworks and relevant national policies, soils, topography, geology, hydrology and aquatic life, climate, rainfall, noise, air quality, vegetation, fauna and flora of the land allocated to the company. Field visits to the allocated compartments and testing of soil and water samples were undertaken to assess the suitability and impact on soils and water from the project. This provided the consultants with certain baseline information and parameters by which an impact assessment could be undertaken. The company's operational plans were also reviewed and stakeholder consultations were undertaken to identify areas of interest and concern and how they would be impacted by the project and its objectives. Key mitigations were then prescribed for soils, hydrology, land clearing, soil preparation, use of agro-chemicals, control of illegal settler farmers and management of stakeholder interests and are subsequently described.

**Context of the Project and Environmental and Social Impact Assessment**

On the whole, the objective of the Environmental and Social Impact Assessment (ESIA) is to identify the sensitive elements existing in the project environment, determine the project components likely to affect the environment, assess the importance of such impacts and recommend mitigation measures and actions, where necessary.

An Environmental and Social Impact Assessment (ESIA) study is a process and a decision making tool for environmental management that will enable REWILDING MAFORKI LTD design and implement the Project without compromising its technical and economic feasibility. An Environmental and Social Impact Assessment (ESIA) study was done for the project activities of REWILDING MAFORKI LTD which includes nursery development, plantation development, andconstruction of offices and staff quarters.

However, for REWILDING MAFORKI LTD, the operational activities only involve the planting and maintenance of 25,000 hectares of rewilding forestry plantations.

REWILDING MAFORKI LTD is obligated by environmental legislation in Sierra Leone to carry outan ESIA for its rewilding plantations in accordance with regulations and requirements of the Sierra Leone Environment Protection Agency (EPA) Act 2010. Thus, this ESIA report is mandatory in assessing the potential beneficial and adverse impacts of REWILDING MAFORKI LTD Project, and recommending mitigation measures needed to prevent, minimize, mitigate or compensate for adverse impacts and to enhance environmental and social benefits of the Project.

Ecoworld (SL) Ltd, a Sierra Leonean based multi-disciplinary environmental consultancy firm was hired by REWILDING MAFORKI to undertake the ESIA Studies.

For the preparation of this ESIA study, a field visit to the Project site in Bureh, Kasseh, Makonteh, Bekeh Lokoh, and Kamasondo Chiefdoms affected communities and baseline surveys were carried out by ECOWORLD (SL) LTD in January and February 2023 to identify and document affected resources, in order to establish the basis for the ESIA study in its entirety. Besides the collection of baseline survey data from the field investigation, institutional and legal frameworks and information from several secondary sources were reviewed, and meetings with relevant parties and authorities were held at various levels (national, district, chiefdom and community) to expedite the ESIA process.

## The ESIA Study

For the preparation of this ESIA Study, a field visit to the Project sites and baseline surveys were carried out by ECOWORLD (SL) LTD to identify and document affected resources, in order to establish the basis for the ESIA Study in its entirety. Beside the collection of baseline survey data from field investigation, institutional and legal frameworks and information from several secondary sources were reviewed, and meetings with relevant people and authorities were held at various levels (national, district, chiefdom and community) to expedite the ESIA process.

The ESIA Study comprises the findings of the environmental and socio-economic baseline surveys; comprehensive description of the Project, including its inputs, processes and operations and outputs; results of the public consultation processes; impact identification, prediction, evaluation and assessment; mitigation measures, against the background of the national legal and institutional frameworks; an operational Environmental and Social Management Plan (ESMP); and a Community Development Action Plan (CDAP). This ESIA Study also describes in detail the mitigation measures, roles and responsibilities of the parties involved in the implementation of the ESMP, including estimated costs. It also provides the time frame for the implementation, as well as a provisional Monitoring Plan, of the EMSP.

The following are the key stages of the EPA-SL ESIA process:

**Stage One – Registration**

1. Project Proponent is required to register the project proposal through an application process. The letter is addressed to the EPA-SL Executive Chairperson and copied to the Director for the attention of the EIA Committee. This is to expedite the processing of the EIA application.
2. EIA Application and Screening Forms are issued to the Project Proponent after a payment of two hundred thousand Leones (Le 200,000) at an account designated for EIA's application fees.
3. The Project Proponent is required to return duly completed forms to the EPA-SL.

**Stage Two – Project Screening**

1. Project proposal and Screening Forms are screened to determine whether or not the development proposal should be subject to an EIA and, if so, the level of detail required.
2. This stage of the EIA licensing process is done within two weeks.

**Stage Three – Scoping**

Scoping the proposal to determine the scope of environmental assessment, the scope of factors to be considered, the parties involved and their interests and concerns, the appropriate level of efforts and analysis, and to prepare guidelines for conducting the EIA.

1. After the project has been classified and a determination is made that the project activity requires an EIA Licence the Project Proponent is required to submit an ESIA Scoping Report on the project.
2. The EPA-SL and the Project Proponent will agree on the Terms of Reference (ToR) before the commencement of the ESIA studies.
3. Upon receipt of the EIA Scoping Report, the process for the determination of the ToR shall be within two weeks.
4. EPA-SL staff will visit the location of the project before approval of the ToR.

**Stage Four – Environmental, Social and Health Impact Studies and Preparation of the Report**

1. Upon approval of the ToR the Project Proponent undertakes the ESIA studies.
2. The ESIA report must document clearly and impartially the project's impacts, the proposed measure for mitigation, the significance of effects and impacts on the environment, and the concerns of the interested public and the communities affected by the project. In this regard, management plans, including the Environmental and Social Management Plan (ESMP), Community Development Action Plan (CDAP), and/or Resettlement Action Plans (RAP), etc., must be clearly articulated in the ESIA document.
3. Upon completion of the ESIA studies, the Project Proponent should submit eighteen (18) hard and soft copies of the ESIA report to the EPA-SL for circulation to the EPA-SL's Board members and other relevant professional bodies.

**Stage Five – Review of the ESIA Report**

1. The EPA-SL will determine whether the ESIA report meets the agreed terms of reference and provides a satisfactory assessment of the proposed project and contains the information required for decision making.
2. The ESIA report will be publicized in gazette and circulated to professional organizations by the EPA-SL for comments. The Proponent will have to disclose the ESIA report through publication of dates for disclosure in newspapers, and hold two or more public hearing meetings for public participation in the decision–making process. The placement of the ESIA report in specific places will enable the affected or interested persons to make comments on the ESIA studies and submit to the EPA-SL for decision making.

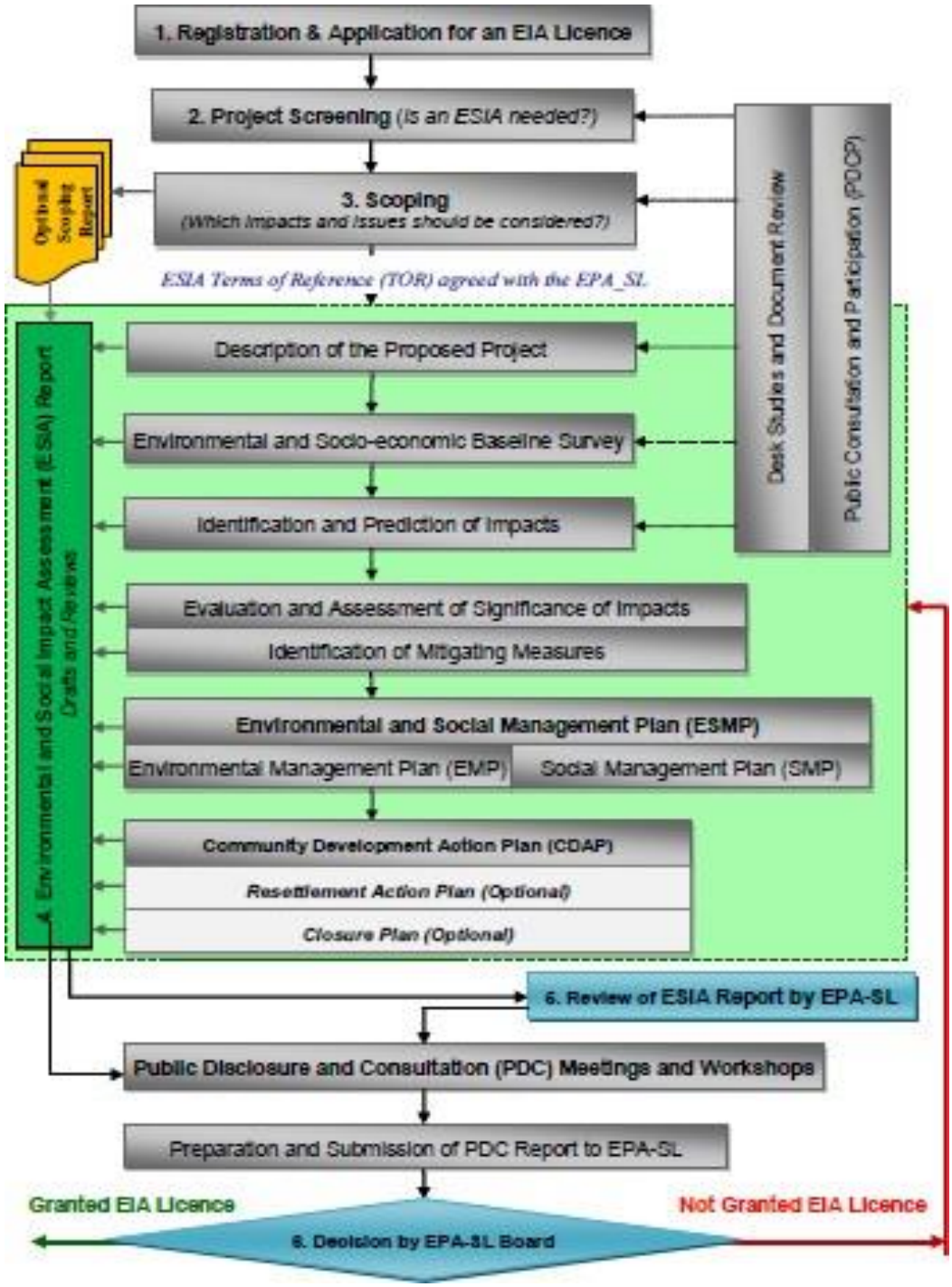



**Fig 1.3: Key steps in the ESHIA Process**

3. The EPA-SL staff will also visit the site or operational areas of the project to ascertain the component and content of the ESIA report in the review stage. Depending on the location of the project the Project Proponent will be required to make announcements over the media in the local languages.

**Stage Six – Decision Making**

1. This is the stage where the ESIA report is approved or rejected.
2. The EPA-SL Board is vested with the power to approve or reject an application for an EIA Licence. If an application for an EIA Licence is approved, it will be subjected to the terms and conditions, provided by the Board and is issued for twelve (12) months and subjected to renewal annually. Also EIA licence fees must be paid.
3. When an application has been rejected by the EPA-SL Board, the Project Proponent has the right to seek legal redress.

**Stage Seven – Compliance and Enforcement**

This is the implementation stage where environmental monitoring and auditing of the project activities are undertaken to ensure compliance with the terms and conditions of the EPA Act 2008 (as amended in 2010).

Note: EPA-SL should be involved through all these stages for guidance and compliance with the provisions of the EPA Act 2008.

## Objective and Scope of the ESIA Study

The ESIA is a process and tool for decision-making and environmental management that will enable REWILDING MAFORKI to design and implement the Project without compromising its technical and economic feasibility and help determine crucial elements that facilitate the making of choices and decisions.

### Objective

The key objectives of the ESIA are to examine the Project's potential beneficial and adverse impacts, and recommend mitigation measures needed to prevent, minimise, mitigate or compensate for adverse impacts and to enhance environmental and social project benefits. Specifically, and in accordance with the EPA Act 2008, the ESIA for the Project seeks *inter alia*, to:

- Describe and analyze the initial state of the Project site and its physical, biological, socio-economic and human environment;
- Describe and analyze all the natural and socio-cultural elements and resources likely to be affected by the Project, including the reasons for selecting the Project site;
- Describe the Project and reasons for its choice among other possible alternatives;
- Identify, predict, evaluate and assess the potential effects and impacts of the Project on the natural and human environment;
- Identify and design mitigation measures to avoid, reduce, correct or compensate for the adverse environmental and socio-economic impacts of the Project;
- Undertake a Public Disclosure and Consultation Programme with the population, non-governmental organizations, trade unions, opinion leaders and other organized groups concerned by the Project;

- Design an Environmental Management Plan (EMP) comprising project and environmental monitoring mechanisms and costs, where necessary.
- Undertake Risk Assessment of the Project;
- Undertake a Public Disclosure and Consultation Process (PDCP); and
- Formulate a Community Development Action Plan (CDAP).

Scope

The TOR provides adequate description of the Project and identifies relevant requirements and activities of environmental and socio-economic concern;

- Establish the existing environmental and socio-economic baseline conditions of the Project's area of influence;
- Predict and examine all the significant environmental and socio-economic impacts on the surrounding communities and the general environment during implementation of the Project and advise on appropriate mitigation and abatement measures against potential adverse impacts;
- Develop an ESIA Report, deduced from the baseline studies and incorporating an Environmental and Social Management Plan (ESMP), based on the identified negative and positive impacts and the mitigation measures, including a provisional monitoring programme for predicted impacts;
- Undertake Risk Assessment of the Project;
- Undertake a Public Disclosure and Consultation Process (PDCP); and
- Formulate a Community Development Action Plan (CDAP).

Guiding Principles of the ESIA Study

This ESIA Study is steered by a number of guiding principles, notably:

• The **Principle of Sustainable Development**: Sustainable development seeks to meet the basic needs of present generations without compromising the ability of future generations to meet theirs. It is therefore based on the principles of equity, not only towards future generations, but also towards present generations, irrespective of their origin.

• The **Precautionary Principle**, whereby in the absence of certainty, and given the scientific and technical knowledge at the time, there should not be a delay in the adoption of effective and proportionate measures to prevent potential severe and irreversible damage to the environment at an economically acceptable cost.

• The **Polluter Pays Principle**, according to which the costs of prevention, pollution reduction and control measures and the restoration of contaminated sites are borne by the polluter.

• The **Principle of Accountability**, whereby any person who, through his/her action creates conditions that affect human health and the environment, is required to ensure their elimination under proper conditions to avoid such effects.

• The **Principle of Participation**, whereby:

- ✓ every citizen should have access to information relating to the environment, including those relating to hazardous substances and activities;
- ✓ every citizen has a duty to ensure the protection of the environment and to contribute to its protection;
- ✓ every public or private person should, in all activities, comply with these requirements; and
- ✓ Every decision concerning the environment should be taken after consultation with the sectors or groups concerned or after public discussion when those concerned have a general scope.

• The Principle of Subsidiary, whereby in the absence of a written general or special rule of law relating to environmental protection, the identified customary norm of a given area considered to be effective with regard to environmental protection, shall apply.

Approach and Methodology of the ESIA Study

To carry out the ESIA Study for its Project, REWILDING MAFORKI LTD solicited the services of ECOWORLD (SL) LTD, a Sierra Leone-based engineering and environmental management consulting firm whose in-depth knowledge and experience in the domain of environmental andsocial impact assessments is nationally recognized. Given the complexity of environmental and socio-economic issues of the ESIA Study, ECOWORLD (SL) LTD mobilized a multidisciplinary ESIA Project Team that comprises experts from various backgrounds - GIS and Mapping, Environmental Management and Science, Soil, Air Quality, Noise, Biodiversity and Socio-Economic.

The ESIA Project Team used both quantitative and qualitative data and various practicable methods and techniques, taking into account the difficulties in obtaining reliable and quality data and information needed for a comprehensive and evidence-based ESIA Study.
The approach and methodology used by the ESIA Project Team are explained in the following sections.

Desk Studies and Document Review

Existing secondary data including documents, maps, satellite imaginary, drawings, data and website resources were reviewed by the ESIA Project Team. The purpose of the review is to obtain an overview of the existing environmental and socio-economic conditions at the Project site, identify gaps and come up with ways of filling-up the gaps.

The main relevant documents found on the Websites are studies, reports and information pertinent to the oil palm industry and projects. Government policies and strategies were also obtained from the Internet. Critical information (such as cultural spots) relating to the ESIA Study area were supported by physical observations and field visits. The overall approach

includes collection of baseline data prior to conducting specific in-depth analysis. The desk study also entailed review of works previously carried out in the Project area.

Description of the Project

The description of the Project included a clarification of the purpose and rationale of the Project and an understanding of its various characteristics - including stages of development, location and processes. The ESIA Project Team assessed the technical and operational characteristics of the relevant components of the project, including the types and quantities of all materials (inputs and outputs) that will be part of the project, their origin and method of production. The Team also assessed the infrastructure to be put in place, the number, types and sources of labour required and recruitment procedure, etc.

Environmental and Socio-Economic Baseline Surveys

The Project Team defined the study area and described the components of the natural and human environment, including:
The ESIA Study supplemented appropriate quantitative and qualitative data and information, as much as possible to present a factual description of relevant environmental components with respect to project stakes and impacts.
This description addressed:

- The state of the physical, biological and socio-economic and cultural environment at the time of carrying out the study;
- Relevant information about changes likely to occur during the project's life span; and,
- Relevant information on environmental changes in the absence of the project.

To limit the amount of information to be collected and analyzed, and to focus on relevant aspects with concrete and realistic proposals, the Project Team set limits that were based on the maximum possible interaction between the project and the environment. The study justified the limits adopted and distinguished between areas of direct impact from those of indirect impact on the natural and human environments.
The site visits by the Project Team to the Project area provided important contacts with the people affected by the Project at an early stage of planning and offered an opportunity to identify the key stakeholders in the Project development and to initiate their participation in the ESIA process at an early stage, enabling the incorporation of feedback from the local community into the Project development.
An important aspect of the baseline survey was carrying out inspections of the proposed mill site, nursery, nucleus area and out grower farmer area to confirm relevant baseline environmental issues and conditions to be affected or are likely to develop from the implementation of the project. The Team undertook field observations of existing properties and

walked through the REWILDING MAFORKI concession and its ancillary activities to observe and identify the various plant species and traces of animal life available.
The ESIA Project Team carried topographical maps and Global Positioning System (GPS) receivers to log where they had travelled and to demarcate the project area of influence. Water samples were taken from the Little Scarecies River and its tributaries upstream and downstream of the concession for field and laboratory analysis of some selected physico-chemical parameters.
The data obtained from the desk and field studies were analysed and are hereby presented in this ESIA Report.

Public Consultation, Disclosure and Participation (PCDP)

The PCDP is a useful tool for managing communications between REWILDING MAFORKI and the project stakeholders. The PCDP aims to improve and facilitate decision-making and create an atmosphere of understanding that actively involves individuals, groups, and organizations that can affect, or be affected by, development of the Project. Emphasis of the PCDP Plan is to allow implementation of a formal programme of communication in an objective, simple manner, to focus efforts on improving communications between REWILDING MAFORKI and interested parties. Monitoring and evaluation of programme results and behavior of the respected parties will enable constant development and improvements to the programme over time.

The PDCP is an on-going process that continues through the life of the Project. For details of the consultations mentioned in this section refer to the Appendices.
Consultations with the affected population and with officials of local government, civil society and other representatives of the affected population were also undertaken to gain a comprehensive understanding of the types and degrees of adverse effects. Furthermore, the consultation process was guided by World Bank and International Finance Corporation (IFC) guidelines.

Identification, Prediction, Evaluation and Assessment of Impacts

The identification, prediction, evaluation and assessment of potential impacts were undertaken to determine how the Project may affect environmental and socio-economic elements.

***Impact Identification***

The Study identified the most significant impacts. At this stage, various impacts identification methods and tools were used:

• *Checklists* - Simple, questionnaire and threshold-of-concern checklists, built around past experiences with similar projects and modified to reflect Project or site-specific characteristics, were used to record important issues, identify where impacts are likely to occur and ensure impacts are not overlooked.

• *Consultation* - Consultation with people that are directly or indirectly affected by the Project were used in determining their views and concerns. It also assisted in identifying how and where impacts may occur, and who will be impacted. Questionnaires and focus group discussions were used to obtain socio-cultural and socio-economic information.
• *Matrices* - Various matrices were used to relate Project activities to environmental and socio-economic components so that their interactions can be used to indicate a possible effect.
• *Spatial Analysis* - GIS and spatial modelling techniques were used to identify the geographic extent of impacts. Overlay mapping was used to prepare maps or layers of information which were then superimposed on one another to provide a composite picture of the baseline environment, identify sensitive areas or resources and to illustrate the influences of activities on the receiving environment.
• *Expert Opinion* - The ESIA process involves more than one scientific discipline, which demanded the need for a team-approach. Although professional judgments and expert opinions are not considered methods (they can be considered a tool for assessing complex project impacts), they formed an intrinsic part of the ESIA. The Team engaged various specialists from appropriate disciplines, with enough experience, at the right time, for a sufficient duration, and with adequate resources throughout the ESIA process.

These potential impacts identified include:
• Degradation of the living environment and conditions of the population living near the project area;
• Degradation of vegetation and increased pressure on natural resources, social infrastructure and the biophysical and socio-economic environment;
• Reduction of land and aquatic biodiversity, ecosystem degradation and alteration of the hydrodynamics of the environment; and,
• Improvement of the quality of life of the local people.

***Impact Prediction***

Once the ESIA Project Team has established that an impact is likely to occur, the impact was characterized. In this context, the Team considered the positive and negative, direct and indirect and, where appropriate, the cumulative, synergistic, latent, reversible and irreversible impacts related to the Project.

The identification of the main impacts brought together the previous steps with the aim of ensuring that all potentially significant environmental impacts (adverse and beneficial) were identified and taken into account in the ESIA process.

To describe the impact, the ESIA Project Team used the following aspects:
• Nature of impact;
• Cause of impact;
• Specific interaction with environment;
• Intensity or scope of impact;
• Extent of impact;
• Duration of impact;
• Frequency of impact; and,

• Occurrence.

The ESIA Project Team predicted impacts to identify the magnitude and importance, including other dimensions of identified change in the environment with the Project, by comparison with the situation without the Project, and also provided the basis for the assessment of significance. The ESIA Project Team made a distinction between the prediction of the likely magnitude (i.e., size) – an objective exercise, and the significance (i.e., the importance for decision-making) of the impacts – a more subjective exercise.

***Evaluation and Assessment of Significance of Impacts***

While objective approaches to identifying impacts and assigning significance attributes may exist, evaluating and ranking impact significance in this ESIA Study remains largely a subjective exercise (taking into consideration acceptability, accuracy, relevance, confidence limits, and proportionality of efforts). The ESIA Project Team assessed the significance of impacts and described their nature and groups/areas affected using appropriate methods. Special attention was paid to impacts with high importance.

The Team used both quantitative and qualitative assessments methods in the ESIA Study. Quantitative methods, using relatively simple models, were employed for quantifying and evaluating physical-chemical impacts and changes. Although impact assessments and evaluations based on these simple models are approximate and simplified representation of dynamic, complex systems that often have many interacting components, the quality of results depended on the availability and quality of the model input data and the particular problem for which the model was applied.

Threshold analysis was also employed by the ESIA Project Team, based on the fact that thresholds exist in most environmental systems, specifying limits in an environmental medium (predominantly but not limited to air and water) that must not be exceeded, or levels of environmental quality that must be maintained.

The ESIA study has been guided by various Sierra Leonean environmental and social legislation, standards, guidelines and/or objectives. In the absence of Sierra Leonean standards for environmental discharges and emissions, the ESIA Project Team was guided by various relevant World Bank/International Finance Corporation (IFC) standards and guidelines, including the relevant international environmental and social agreements to which Sierra Leone is a party of. Where it was either impossible or impracticable to approximate nature simplistically using quantitative models or methods, less formal qualitative methods (based on expert advice, experience drawn from historical and scientific evidences, or conceptual models) were used. The ESIA Project Team presented the indicators of each impact and how to measure and monitor them. For impacts that could not be quantified, the study described them in detail, highlighting the causes and manifestations.

For each impact identified, the ESIA Project Team prepared an impact sheet containing the following information:

- Description and location of impact identified;
- Source of impact;
- Brief description of the causes and manifestations of the impact;

- Characterization of impact;
- Evaluation of the (absolute and relative) importance of the impact;
- Appropriate environmental measure (type, efficiency and principle); and
- Evaluation of the residual impact.

Mitigation of Impacts

Mitigation involves the introduction of measures to avoid, reduce, remedy or compensate for any significant adverse impacts. The Project Team identified corrective and additional actions earmarked in different phases of the project to eliminate or reduce the negative impacts identified, and proposed measures designed to promote or maximize their positive impact. It also presented an evaluation of the effectiveness of the mitigation measures proposed and estimated their cost. The Team evaluated the residual impacts by making a projection of mitigation measures. In the case of unavoidable and irreducible residual impacts, the study proposed compensation measures for the bio-physical environment or communities affected.

Environmental and Social Management Plan (ESMP)

The ESIA Project Team prepared the ESMP of the Project, including environmental measures to be implemented, budget estimates, the implementation schedule, needs in terms of personnel and resources and any other support required for implementation, mitigation and compensation measures.

(a) Institutional requirements for the implementation of ESMP

The Project Team assessed the capacity of stakeholders, particularly those in the affected communities, to implement the ESMP and, where necessary, prescribed capacity building to enable the implementation of management and monitoring plans.

(b) Programme for the Implementation of Measures and Monitoring

The Project Team proposed a programme for the implementation of measures and classified the measures formulated in order of priority, which was given to measures related to direct and long/short-term impacts. The Project Team identified and characterized the actors and institutions capable of implementing the proposed measures and, where necessary, the steps to be taken to strengthen or expand them.

To enable the implementation of the ESMP, the Project Team estimated the costs of recommended mitigation and compensation measures, as well as the costs of compliance with all relevant Sierra Leonean and international legislations and guidelines specified in this ESIA Report. The Team indicated the monitoring parameters to be used by agents and their costs.

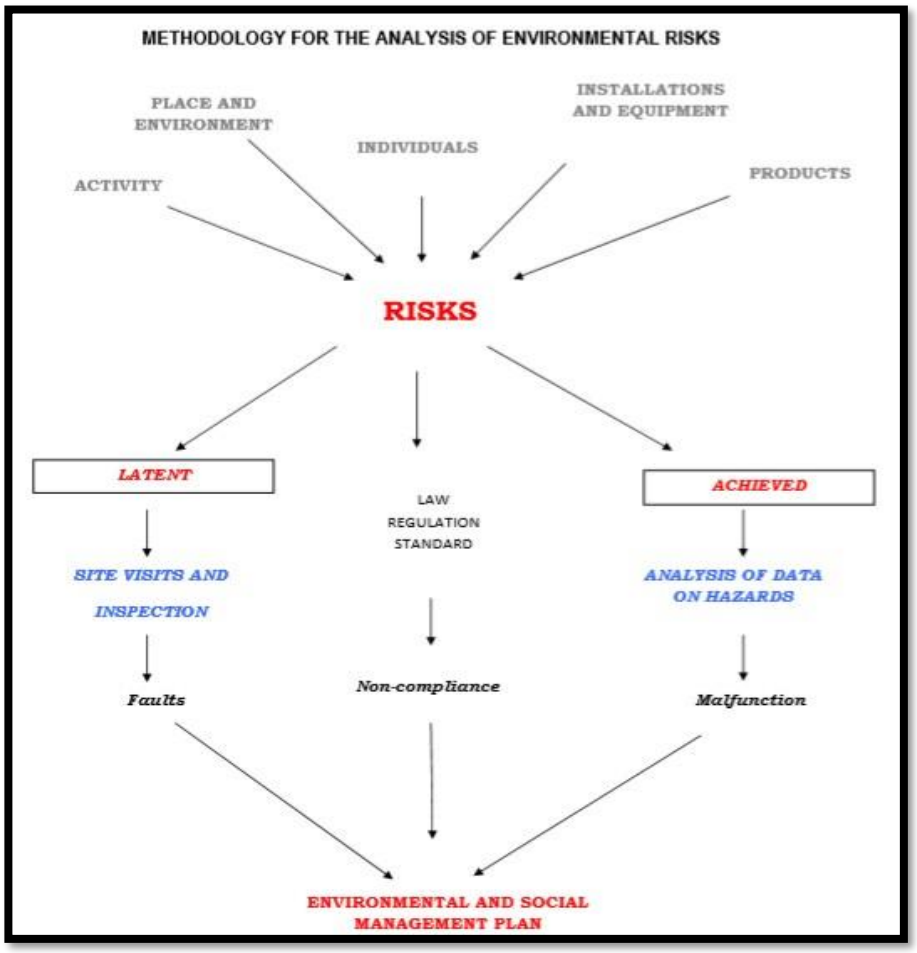
Assumptions

1. The ESIA Project Team assumed that all relevant and requested background and ESIA data and information provided by REWILDING MAFORKI and other third parties are reasonably accurate, reliable and fit-for-purpose.
2. In the absence of relevant and reliable data the ESIA Project Team relied heavily on scientific and/or expert judgments to assume and estimate potential impacts.

Limitations

1. Most of the socio-economic data and information about the Project were collected during the baseline survey through questionnaires and focus group discussions. Hence, several recommendations, opinions or findings stated in this ESIA report are based on circumstances and facts as they existed at the time ECOWORLD (SL) LTD performed the field works.
2. There is a paucity of information on the natural hydrology of the rivers and streams in the Project Area.

Notwithstanding the aforementioned assumptions and limitations, the ESIA Team sought relevant data and information from other sources at a level of detail adequate to conduct the ESIA. Hence, it is can be assumed that the estimates and conclusions contained herein are relatively reliable under the conditions outlined above and qualifications described elsewhere in this ESIA report.



# CHAPTER 2: DESCRIPTION OF REWILDING MAFORKI PROJECT ACTIVITIES

Rewilding Maforki is implementing a reforestation project with about 466ha established in Port Loko District, North-western Province, Sierra Leone. Rewilding intends to scale these activities over 25,000 ha of land within the same district. Planting will takeplace over the next 6 years. The above activities are set to be registered under Verra as a carbonprogram for which Rewilding Maforki is partnering with Eco securities. The project intends to plant a total of 19,800 hectares (ha) for rewilding and 5,200 ha for commercial purposes. Currently, 466 hectares have been planted in Maconteh and Kasseh chiefdoms since June 2022. In Maconteh, 266 ha have been established while 200 ha of the plantations have been establishedin Kasseh.

***Rewilding***

Species planted are *Terminalia Superba, Terminalis ivorensis* and *Nauclea diderrichii* in the rewilding sections. The trees are spaced at 4 metres by 4 metres due to the high biomass accumulation of the native species. *Terminalia superba, Terminalis ivorensis* and *Nauclea diderrichii* have been planted in the already established plantations in Maconteh and Kasseh over 232 ha. Ideally, for a successful rewilding project, more than five species are required to be planted in an area. A detailed planting plan including the exact species for the rewilding is yet to be availed. For a restoration project, only native species should be planted, adaptive to the local agro-ecological zone, in a proper mix that mimics natural conditions. This information is key for comprehensive carbon estimations. Rewilding Maforki seeks to establish its own tree nurseries to sustain the supply of the quantity required from 2023 with the support of Njala Seed Bank as well as improve the diversity of the rewilding zones.

Table 2.1. Species planted in Maconteh and Kasseh Chiefdoms in 2022

| **Year** | **Commercial species** | | **Rewilding species** | | |
|---|---|---|---|---|---|
| | *Acacia Gmelina mangium* (ha) *arborea* (ha) | *Terminalia superba* (ha) | *Terminalia ivorensis* (ha) | *Nauclea diderrichii* (ha) | Total (ha) |
| 2022 | 204.11 29.85 | 223.17 | 3.9 | 4.8 | 466.38 |

The boundaries of the project area are such that they are surrounded by villages and communities. The project is operating in five chiefdoms (Bureh, Kasseh, Maconteh, Bekeh Loko and Kamasondo) in the Port Loko District.

The project area being a Savanna and with a history of human induced land degradation, the current biodiversity has deteriorated. For example, several accounts from the Forestry Department, paramount chief and Rewilding Maforki staff reveal that species of antelopes have not been sighted for a very long time. Similar to the fauna, the flora has declined, additionally exacerbated by slash and burn agricultural activities by communities.

The Port Loko forest reserve, one of the high conservation areas is always experiencing high levels of degradation mainly due to settlement inside and around the forest, and illegal harvesting of wood for charcoal and Timber. This project will help alleviate this pressure by providing an alternative source of livelihood and by providing commercial timber. All this is expected to increase biodiversity in Port Loko reserve itself and between the Project areas and the reserve by creating a corridor for wildlife to move freely.

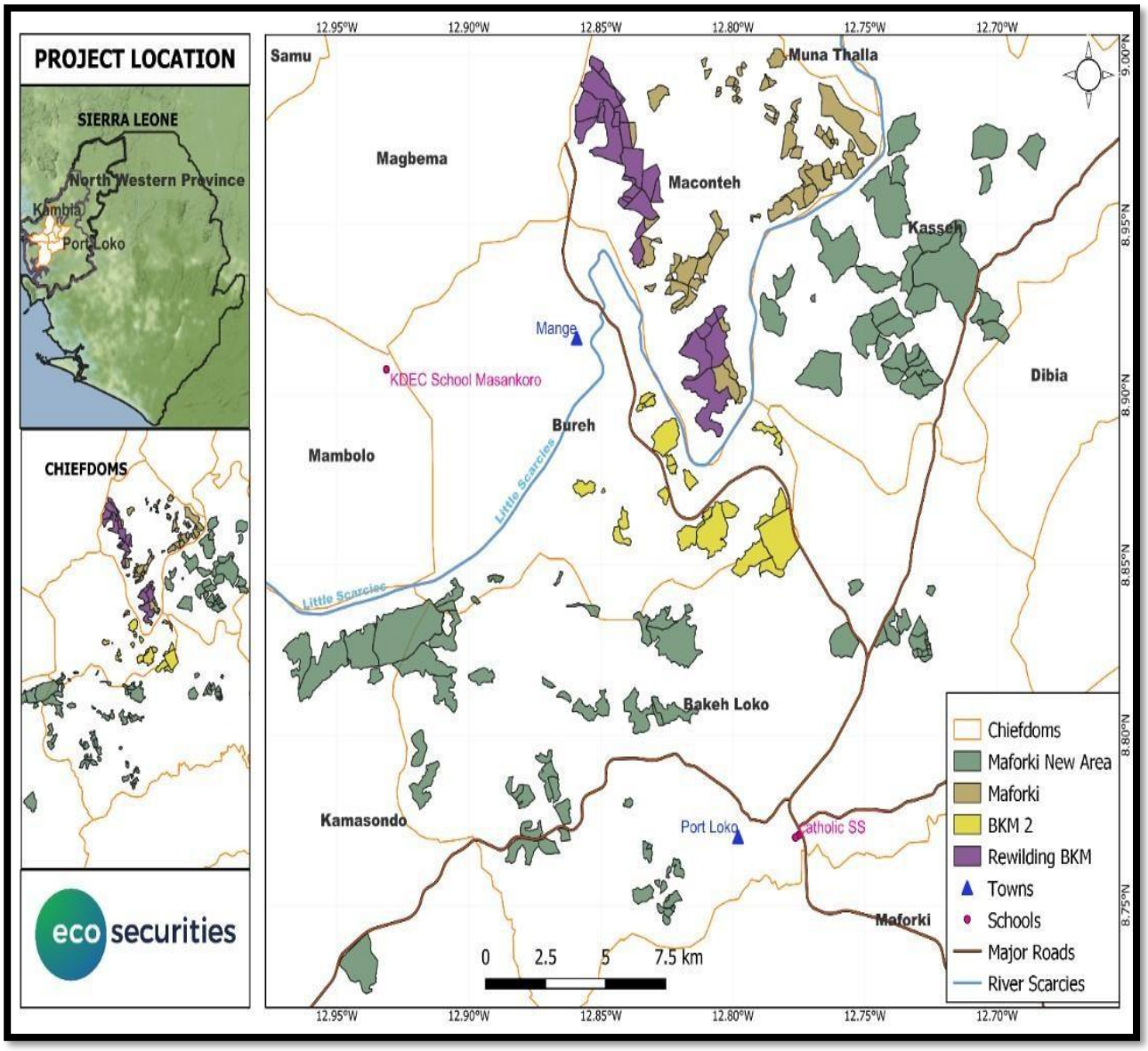



Figure 2.1: Map showing the project location

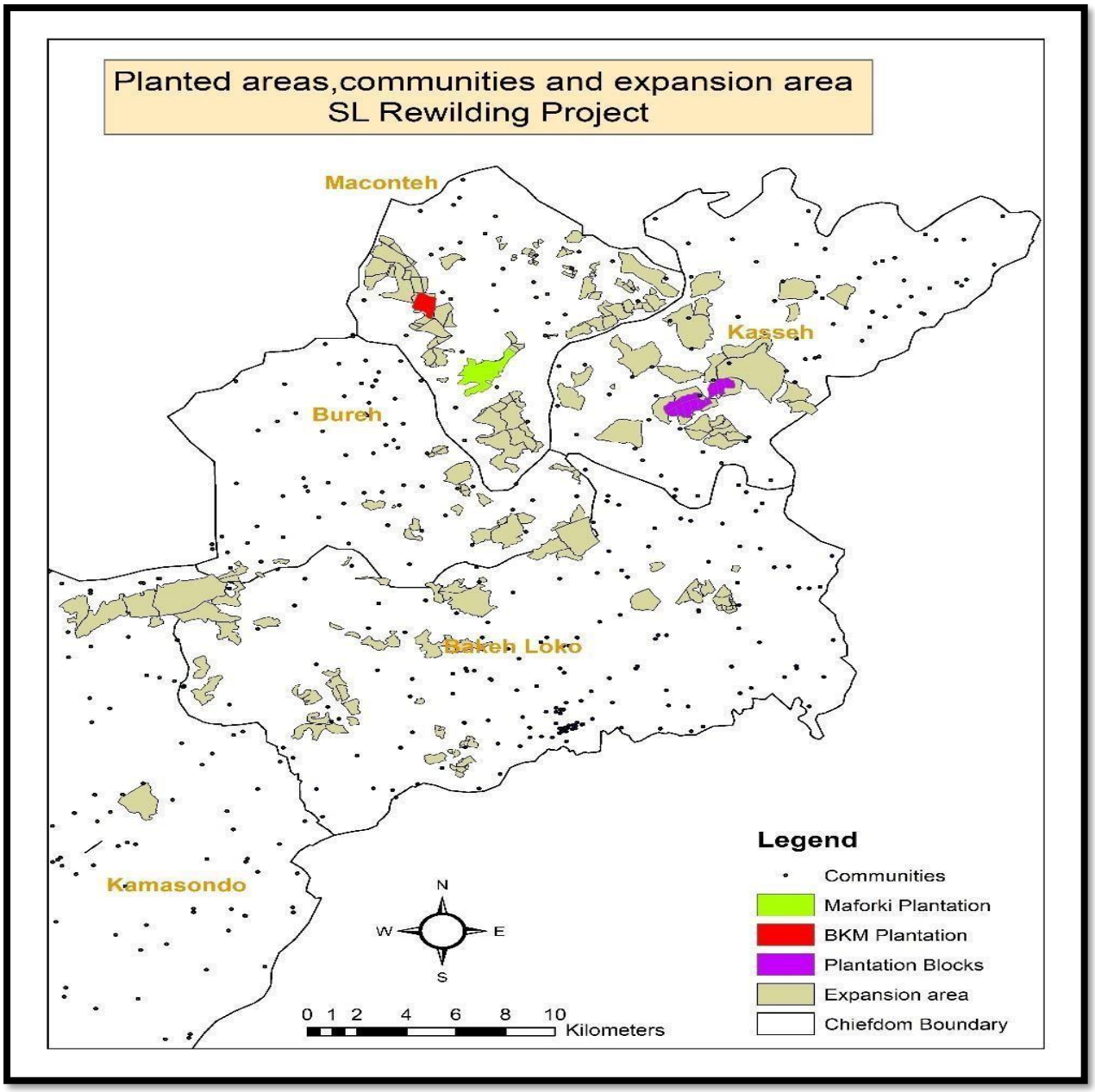



Figure 2.2. Map showing the planted areas, communities, chiefdoms and project expansion area.

The proposed development will involve nursing of seedlings, land preparation, creation of conservation management areas, planting of fast growing tree species, upgrading and maintenance of old logging roads, sustainable selective harvesting, creation of employment opportunities for locals in the development of modern agro-forestry initiatives, collaboration with key stakeholders to support local good causes and distribution of financial benefits from plantation outputs for stakeholders.

*Project Justification*

Timber demand in West Africa is growing with booming economic growth and construction. This is against a backdrop of decreasing timber supply, as stocks of standing timber continue to be depleted with unsustainable harvesting. These macro factors provide an economic opportunity on which to build a profitable and hence sustainable and economically secure plantation forestry business. Construction timbers (for poles, sawn timber and wood based panels) represent the largest and fastest growing segment of the timber market in West Africa. Sierra Leone is currently experiencing serious shortages in good quality timber and therefore, it is recognized within the Forestry Division and industry that fast rotation growing plantations is the future for rehabilitation of degraded areas and a strategy to minimize the impacts of climate change by increasing forest covers.

It is also Government policy to promote private sector participation in commercial forest plantation development in order to sustain the supply of timber and timber products to the timber and wood-based industries. For these and other reasons extensive areas of sustainably managed forest plantations are needed in the country to meet the growing demand for industrial timber.

Rewilding Maforki Ltd is implementing a reforestation project with about 466ha established in Port Loko District, North-western Province, Sierra Leone. The company intends to scale these activities over 25,000 ha of land within the same district. Planting will takeplace over the next 6 years. The above activities are set to be registered under Verra as a carbonprogram for which Rewilding Maforki Ltd is partnering with Ecosecurities.

Some of these cash outflows of the project will impact positively and directly in the local area in the form of employment, income for workers, increased purchases and spending within the community, education and training, provision of funds for the implementation of development projects for the area and strong stakeholder collaboration. This will no doubt result in economic spin-offs for the community and its stakeholders. Therefore, the value of the Rewilding Maforki development project has far reaching consequences for the people of Kamansondo, Bureh, Kasseh, Maconteh, Bekeh Lokoh, Dibia and Maforki Chiefdoms and surrounding communities; but principally it has the potential to:

- Generate significant accruable financial benefits for its key stakeholders
- Provide increased local employment at various stages over the next 10-15 years,
- Enhance the living conditions and well being of its potential workforce and their families
- Build strong stakeholder collaboration with local traditional authorities to achieve social responsibility obligations and support of good causes.
- Support the Government of Sierra Leone, through the Forestry Department to secure direct foreign investments for fast growing tree plantation development and rehabilitation of degraded areas.

- Support government efforts in achieving climate change mitigation through the sequestration of carbon from trees through the sale of carbon credits.

The project will ultimately contribute to increased supply of timber and timber products as well as revenue to the Forestry Department derived from local and export levies that would accrue from harvesting, processing and export of products. Small and medium-scale support businesses are also likely to spring up to boost economic activities; particularly at the project site area and other surrounding villages close to the project area.

The environmental benefits expected from the project will include the improvement of the protective function of the forest cover within the project area. The project will adopt best practices to ensure sustainable forest management and contribute to the establishment of a vegetative cover to minimize the intensity of desiccating winds, improvement in soil and water conservation; as well as the reduction in the loss of soil nutrients through erosion. The project's plan to develop conservation areas and protect areas of environmental sensitivity will contribute greatly to environmental conservation in the reserve.

The fringe communities in the project area will benefit from diverse employment opportunities that will be offered by the project. The project will encourage agro-forestry and inter-cropping practices which will contribute to income generation in and around the project area and ultimately lead to improved welfare and generally a reduction in poverty.

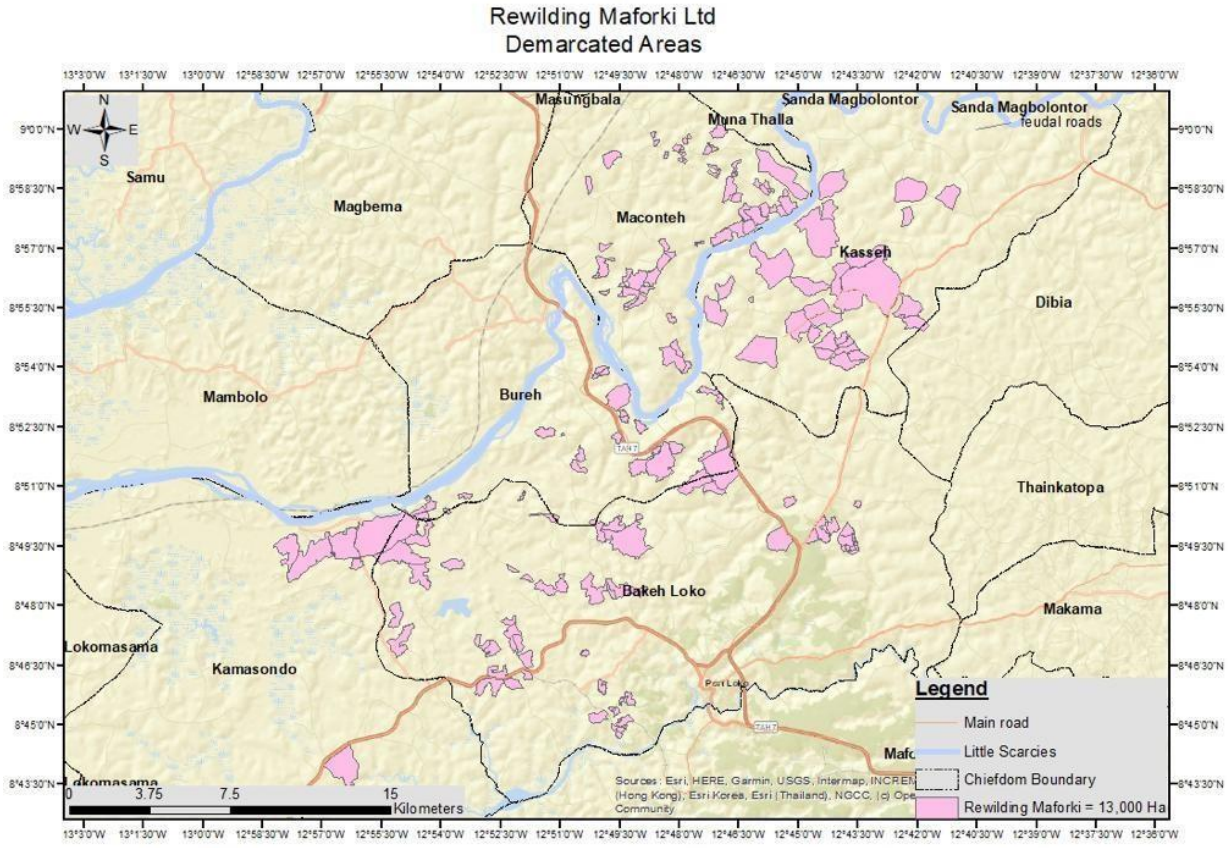
Key Project Activities

The key project activities of Rewilding Maforki Ltd proposed development are as follows:

- Pre-planning phase, Signing of leases, Land allocation, Land surveys,
- Land Mapping, Selection and Compartment surveys/ planting trials
- Scoping and EIA Approvals Stage
- Nursery Establishment and Seedlings Development
- Land Preparation
- Planting of rewilding trees
- Road maintenance and construction
- Replanting of Indigenous species
- Creation of conservation areas and Buffer Zones/Riparian strip
- Thinning and Maintenance of tree plantations
- Selective Harvesting
- Labour and Staff recruitment
- Forest Fire Mitigation Management
- Annual Social Responsibility Commitments/Agreements

## *Land Mapping and Planning*

As part of the initial project activities, Rewilding Maforki have mapped out the boundaries of the proposed development using Geographical Information Systems (GIS) and field verification of boundary pillars as shown in the image below.




Rewilding Maforki Ltd assesses the terrain and examines the basic structure of soils and grass vegetation. Special consideration is given to important land planning issues such as land slope, water bodies, identification of any cultural sites, identification of riparian strips and sites for conservation protection, existence of agricultural farms, condition of old logging roads and wildlife habitats. RML is currently in the process of finalizing arrangements for asatellite land and vegetation mapping exercise to be carried out in its compartments; based on 1m contour intervals and 0.5m pixel quality. This will provide a very detailed high resolution mapping of the reserve. This information will enable RML to identify areas for conservation, boundary verification, silvicultural planning; assist in site and species matching, and to plan the best possible options for achieving a balance between land use, sustainable forestpractices and care for the environment.

*Nursery*

The establishment of a nursery is an important component of the proposed project. Rewilding Maforki proposes to establish a nursery located on a privately leased land. The nursery will be used to raise seedlings for transplanting into the field and to ensure that the seedlings are properly prepared and selected for planting. The seeds are first planted in trays with Coco-peat medium, and then germinated under 35% shade netting. After 3-4 weeks the seedlings are transferred to steel tray tables to harden off for a further 3-4 weeks with the roots being air-pruned. Water sources for the seedlings were initially to be derived from the nearby River or bore hole. The source and seedlings type for the project have been approved by the management.

*Species Selection*

Rewilding

Species planted are *Terminalia Superba*, *Terminalis ivorensis* and *Nauclea diderrichii* in the rewilding sections. The trees are spaced at 4 metres by 4 metres due to the high biomass accumulation of the native species. *Terminalia superba, Terminalis ivorensis* and *Nauclea diderrichii* have been planted in the already established plantations in Maconteh and Kasseh over 232 ha. Ideally, for a successful rewilding project, more than five species are required to be planted in an area. A detailed planting plan including the exact species for the rewilding is yet to be availed. For a restoration project, only native species should be planted, adaptive to the local agro-ecological zone, in a proper mix that mimics natural conditions. This information is key for comprehensive carbon estimations. Rewilding Maforki/BKM seeks to establish its own tree nurseries to sustain the supply of the quantity required from 2023 with the support of Njala Seed Bank as well as improve the diversity of the rewilding zones.

Land Preparation

Appropriate land preparation is a silvicultural requirement that aims to avoid unnecessary environmental damage and successfully establish a plantation. Land preparation operations mustbe related to prevailing site conditions and must be cost-effective since these initial costs are compounded over an extended period. Incorrectly applied or careless operations particularly on sensitive soils may result in long-term damage to the site. The required operations for establishment will vary with soil and site characteristics. Land preparation involves appropriate soil preparation and soil testing and analysis. This will ensure optimisation of the site as soil preparation, to a large extent, determines the success of the planting. The company intends to undertake soil preparation when the moisture content of the soil is optimal. Ripping of soils willbe undertaken on soils with a clay content of over 35%. Ripping will be done along the contour. If ripping is not done along the contour, then the ripline should be a maximum of 50 metres longwith a 5 metre buffer zone between riplines. The depth of rip should be sufficient to overcome the limiting factor in the soil.

Rewilding Maforki will also undertake ploughing of lands in order to loosen the soils for planting. In this regard Rewilding Maforki will plough along (i.e. parallel to) the contour to avoid erosion, and will not be undertake this activity on gradients steeper than 10%.

*Planting*

Planting is targeted for between May – June annually depending on the weather during that period. All potted planting materials will be transported from the nursery using flat-bed trucks and brought to the planting site on the day of planting.

*Maintenance*

It should be noted that most common weeds grow faster than newly-planted trees and unless the weeds are controlled effectively, the plantation investment will suffer seriously (and may even fail completely). Weeds cause many problems within a plantation: they take up nutrients that would have been used by trees to enhance growth; once taller than trees, weeds can shade them from sunlight; lower plantation hygiene as a result of weed growth can render the plantation susceptible to pest and disease attack; most importantly, weeds provide fuel for forest fires, creating a fire hazard. Careful planning can greatly reduce the impact of weeds on tree growth as well as minimizing costs.

Weeding, whether performed manually or by hand, can only remove weeds that have germinated seeds will continue to germinate and follow-up inspections and weeding will always be required. Weeding must therefore be performed before the weeds are able to seed in order to be effective.

Following planting, a manual ring weed will be undertaken to minimize competition to ensure good growth of the seedlings. The ring weeding will be done within one month of the seedlings having been planted. The aim of the operation is to create a weed-free zone of 50cm radius

around each newly-planted seedling. This operation is best carried out using a hoe and care will be taken not to hoe right up to the stem, as this causes soil to be removed from the base of the stem which can lead to the seedling falling over.

Tractors will be used where appropriate, towing a disc, plough, rotavator or flail mower to slash down weeds. This can be very cost-effective if carried out under the correct conditions; whereby great care is taken to ensure that the conditions are suitable and that there is sufficient inter-row space.

When necessary chemical weeding will be undertaken using Glyphosate (herbicide) to kill undesired weeds. Being mindful that the chemical can also kill the seedlings if applied without care, the application will be safer in the pre-planting clearing. When used in postplanting weed control, measures will be taken to prevent it coming into contact with the planted trees. Therefore cones 1m in diameter will be placed over the planted trees to prevent any contact.

Before undertaking chemical weed control, the spraying team will be well-trained in the use of the chemical and equipment's and provided with personal protection equipment (PPE).

*Pruning*

This operation will be carried out to provide a knot-free timber from the growing tree. Branches that develop up to, at least, a third of the tree height will be removed during the third, fourth and fifth years of establishment. Intensive pruning of buds and branches will also be undertaken regularly after the first pruning operation.

*Road Construction and Maintenance*

Many of the old logging roads in the reserve were poorly constructed and as such require maintenance to bring them up to modern forestry standards. Rewilding Maforki will therefore rehabilitate old logging roads; where they occur within its allocated compartments.

The planning, construction and maintenance of the forest road network, depots, landings and extraction routes are referred to as access development. This is necessary to enable equipment and personnel to gain access to the standing tree to remove products from the forests. Tactical planning is a necessary step in road planning and construction and should be a function of the time frame of the tactical harvesting plan. Rewilding Maforki therefore aims to achieve an optimal balance between forest roads, extraction routes, depots and landings to maximise the profitability of the forest estate.

*Fire Management*

Rewilding Maforki considers fire protection a key issue since it poses the greatest physical risk to the company's biological assets as well as to the already heavily-degraded reserve. Fire

protection will therefore focus on fire prevention, fire risk reduction and fire preparedness and suppression.

Fire prevention measures require projects of active engagement with the local community. Most fires are man-made, started to clear land or for the purposes of hunting. Agricultural methods using fire to clear land are less efficient in terms of retaining nutrients and organic matter in the soil, and efforts will be made through education programmes to re-educate local farmers who clear land in this way.

Fire risk reduction methods will focus on physical methods of preventing fires from occurring or reducing the potential severity of fires. Weed control methods will aim not only at preventing competition with young trees but also at reducing the volume of combustible material that builds up beneath the trees. Intensive weed control methods as outlined above will be used for both purposes. Fire breaks are a further tool that will be used to reduce the impact of fires and aid in the ability to fight them. Fire breaks 10 metres wide will be created around planting units within the plantation and also serve as access routes within the plantation. Some green belts have been established and will be extended further into other high-danger areas at strategic locations along the perimeter of the reserve. Local farmers will be encouraged to plant groundcover crops within the green belts to further enhance their capacity to retard the spread of fire.

Fire preparedness is of high importance during the fire season (December – April). Roaming security guards will be employed and deployed on 24-hour patrol of the plantation during the dry season. The guards will be provided with transport and communication gadgets to facilitate communication between the groups for rapid response to manage fire outbreaks. In support of its fire fighting efforts, Rewilding Maforki also proposes to partner with locals for effective fire management support.

*Labour and Staff Recruitment*

Rewilding Maforki Ltd will recruit workers for its field operations from within the community and surrounding areas. These workers will complement and support plantation development managers who will oversee the implementation of the project. It is estimated that about 500 workers will be recruited to support plantation development objectives; together with management and administrative support staff. It is also worth noting that subject to the company meeting its plantation goals and securing appropriate land, another worker could be employed in the development and operation of a treatment plant.

*Annual Social Responsibility Commitments*

The Company has instituted a policy that an amount of its annual operating budget will be ring-fenced for the funding of socially and environmentally beneficial projects aimed at addressing the needs and requirements of the local communities in which it operates, with a particular emphasis on projects which will enhance education and healthcare.

Rewilding Maforki will sustain its collaborative efforts to support local initiatives to provide other social amenities that qualify for funding under the package.

## Policy, Legal, Regulatory and Administrative Framework

There are policies and legislations that govern and regulate projects that may have potential impacts on the environment. These may be national and sector policies; national legal framework and assembly bye-laws; national guidelines; as well as international policies and guidelines. The various policy and legal framework are formulated to provide the vision for the management of the environment in a sustainable way to benefit the nation with respect to the use of national resources and the safety of the populations and the environment.

### Policies and Plans

#### Medium Term National Development Plan 2019-2023

The Government of Sierra Leone's new Medium-term National Development Plan (MTNDP) 2019–2023 has been founded on a strong political commitment to deliver development results that would improve the welfare of Sierra Leone's citizens. Cluster 2 of the Medium Term National Development Plan, diversifying the economy and promoting growth prioritizes Agriculture as the backbone of the economy of Sierra Leone. Some of the key policy actions of this cluster are:

- Develop value chains for some key agricultural products.
- Provide better market facilities and access to agricultural inputs (i.e. agro-chemicals, including fertilizers, herbicides, and biobased insecticides and preservatives; investment in feeder roads and information technology, etc.).
- Promote sustainable investment in mechanized commercial agriculture (i.e. tractors, power tillers, irrigation facilities, etc.) and introduce private sector management of the hiring and lease of machinery at the district level to increase the acreage of land under cultivation
- Strengthen seed production and improve both the formal and informal seed sectors operating in the country.
- Strengthen cooperative farming (i.e. farmer-based organizations) and build the capacity of Agricultural Business Centres to promote integration into agricultural value chains.
- Promote schemes that would encourage the public to engage and invest in agriculture.
- Promote organic farming to minimize biodiversity loss.

One of the key targets of this cluster is to achieve 90 percent food self-sufficiency by 2023. REWILDING MAFORKI project activities are in line with the National Plan as its operations would contribute towards supporting the economy and in diversifying the country's economy.

#### National Environmental Policy, 1994

This 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. It also promotes efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of nationals, and serves to enrich the understanding of ecological systems and natural resources

important to the Nation. Thus 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 takes into consideration major sector goals and policies for enhancing sustainability in environmental management systems. The following sectoral policies are highlighted within the National Environmental Policy:

- Land Tenure, Land Use and Soil Conservation;
- Water Resources Management;  Forestry and Wildlife;
- Biodiversity and Cultural Heritage;
- Air Quality and Noise;
- Sanitation and Waste Management;
- Toxic and Hazardous Substances;
- Mining and Mineral Resources;  Coastal and Marine Resources;
- Working Environment (Occupational Health and Safety);
- Energy Production and Use;
- Settlements, Recreational Space and Greenbelts;
- Public Participation;
- Quality of Life;
- Gender Issues and the Environment;
- Institutional and Government Arrangements;
- Legal Arrangement.

Draft National Lands Policy, 2013

The Land Policy of Sierra Leone aims at the judicious use of the nation's land and all its natural resources by all sections of the Sierra Leone society in support of various socioeconomic activities undertaken in accordance with sustainable resource management principles and in maintaining viable ecosystems.
In specific terms, the objectives of this policy are to:-

- Ensure that every socio-economic activity is consistent with sound land use practices through sustainable land use planning in the long-term national interest;
- Ensure the payment, within reasonable time of fair and adequate compensation for land acquired by government;
- Provide laws that will protect citizen's right to land against Government;
- Instill order and discipline into the land market to curb the incidence of land encroachment, unauthorized development schemes, multiple or illegal land sales, falsification and multiple registration of land documents, land speculation and other forms of land racketeering.

For the purpose of sustainability of land use, it is stipulated in section 4.4 of the policy, that:

- Inland and coastal wetlands are environmental conservation areas and activities considered incompatible with their ecosystem maintenance and natural productivity are strictly prohibited;
- All land and water resources development activities must conform to the environmental laws in the country and where Environmental Impact Assessment report is required this must be provided. Environmental protection within the 'polluter pays' principle will be enforced.

Final National Land Policy, 2015

The aspiration of this policy is to move towards a clearer, more effective and just land tenure system that shall provide for social and public demands, stimulate responsible investment and form a basis for the nation's continued development.

The specific objectives of this National Land Policy are:
a) To clarify the complex and ambiguous constitutional and legal framework for sustainable management of land resources;
b) To promote law reforms that will further harmonize the two separate jurisdictions of the current land tenure systems;
c) To ensure the security of tenure and protection of land rights to all legitimate landholders, regardless of their form of land tenure;
d) To promote equitable access to land
e) To promote and enforce sound land use, regulation and management To build capacity for and promote land use and country planning strategies for sustainable development in both urban and rural areas;
f) To streamline and decentralize land administration to be more efficient, transparent and effective

Draft Water and Sanitation Policy 2011

In May 2011 the Government of Sierra Leone launched the National Water and Sanitation Policy. The policy contains the ambitious targets of extending national water supply and sanitation coverage to 74% and 66% respectively, aligned to the Millennium Development Goals (MDGs).

The objective of this policy is to increase the political prioritization for Water, Sanitation and Hygiene in Sierra Leone, accelerate access to safe, reliable, affordable and sustainable water and sanitation services throughout the country and to develop a comprehensive framework for promoting the optimal, sustainable and equitable development and use of water resources for the benefit of all Sierra Leoneans. This project would help to improve on the sanitation and hygiene of communities through it community development action plan.

National Biodiversity Strategy and Action Plan, 2003

The action plan proposed in the Sierra Leone Biodiversity Strategy and Action Plan comprises a series of measures and mechanisms intended to conserve and promote the sustainable use of the different components of the country's biodiversity. The action proposed covers 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;
- Catalyze and provide guidance for legal policy and institutional reforms necessary to achieve effective conservation and sustainable use of biological diversity;
- Enhance the planning and co-ordination of national efforts aimed at the conservation and sustainable use of biological diversity;
- Guide the investment and capacity building programmes for the conservation and sustainable use of bio-diversity;
- 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.

An environmental management plan has been developed to ensure compliance with provisions of this plan.

National Agricultural Policy (NAP)

The overall National Agricultural Policy (NAP) objectives of the Government of Sierra Leone are to promote sustained growth in the agricultural sector and the achievement of food security and job creation. Specific objectives include:

- Increase diversified agricultural production and food availability.
- Raise rural incomes and employment while ensuring adequate protection of the environment.
- Maximise foreign exchange earnings from agriculture.
- Ensure balanced regional growth and equitable distribution of income.

The NAP is intended to outline the government of Sierra Leona's policy objectives and strategies for meeting its overall goals of poverty reduction and establish transparent guidelines for the participation of various stakeholders in the agricultural sector. The guidelines provide a framework

for developing detailed Action Planes by various stakeholders operating in the agricultural sector in Sierra Leone.

The development of the Agriculture Sector Policy paper of Sierra Leone was guided by the following general principles:

• Growth in agriculture is central to government's poverty reduction objectives.

• Growth in agriculture requires improvement in the entire value chain of production processing and marketing. Hence the need for higher level of investment commensurate with the importance of the sector.

• The focus of government in immediate post conflict situations is the provision of relief to small scale farmers and rehabilitation; when this are achieved the focus shifts to development

• Government 's role in development is characterized by (1) the creation of an enabling environment such as a sound economy and rural infrastructure to stimulate the involvement of the private sector in provision of rural credit and in input and output marketing (2) strengthening of research and extension services and (3) empowerment of farmers

• As the private sector establishes itself, government becomes more of a facilitator and promoter rather than the direct provider of goods and services. Nevertheless safety nets for the most vulnerable of the population are required.

• Decentralization of government's services to the regions, with an efficient centre, improves performance of government.

• Liberalization of the economy and operation of a free market facilitates growth in agricultural and non-agricultural sectors. Nevertheless smart, short term well targeted subsidies are worthy of consideration.

• Improved access by farmers to research and extension services increases the effective demand for inputs.

• Food security is a cross cutting multi-sectoral issue involving several government ministries.

• A range of stakeholder including the private sector, farmers, the right to food secretariat, the universities, NGO's, donor agencies, the international community, have important roles in planning, priority setting, and execution of programmes aimed at improving food security.

• Exploitation of new products and markets in West Africa and worldwide in addition to the traditional products and markets will improve growth in the agricultural sector.

• Partners from outside Sierra Leone are to be encouraged to participate in agricultural development programmes that are in the interest of Sierra Leoneans.

• Sustainability is of major concern in the formulation and evaluation of agricultural development programmes

• Continued commitment by government of Sierra Leone to implementation of multi and bilateral agreements between Sierra Leone and the international community is required.

• Continued support to Sierra Leone from the international community for development is needed.

Conservation and Wildlife Policy, 2010

The Conservation and Wildlife Policy (2010) was developed in recognition that the previous wildlife conservation policy was in need of modernization. Current legislation based on the 1972 Wildlife Conservation Act (as was the case of the previous wildlife conservation policy) does not reflect the advances made in biodiversity conservation in the past four decades; it also does not take into account international obligations that arose after its entry into force, such as the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species (CITES) and the United Nations Framework Convention on Climate Change (UNFCCC).

The Conservation and Wildlife Policy identifies that challenges to biodiversity conservation in Sierra Leone result from a lack of knowledge due to "recent conflict, land use change, uncontrolled exploitation of natural resources, and a lack of recent comprehensive inventory". The vision of the policy document is to establish "an integrated wildlife sector that achieves sustainable, rights-based management of wildlife resources for biodiversity conservation inside and outside wildlife conservation areas which benefits present and future generations of Sierra Leone and humankind in general." The policy presents a plan for biodiversity conservation based on a set of "policy statements" outlining concrete policy goals and develops the necessary institutional arrangements for policy implementation. In line with the outcomes of the environmental baseline survey, no threatened or endangered species was encountered. This project will in no way violate provisions of this policy. However, and environmental management plan has developed to deal with any unforeseen threat to wild life.

Forestry and Wildlife Sector Policy for Sierra Leone (Draft), 2003

This draft policy document is still under review and awaiting parliament approval. The goal of the document is to support the development and reduce the exploitation of forests and wildlife of Sierra Leone in a sustainable manner for the material, cultural and aesthetic benefit of the people of Sierra Leone in particular and mankind in general. The main general forestry policy objectives of Government are to:

- Promote best practices in forest management so as to develop an environmentally friendly, self-sustaining forestry sector that is sensitive and responsive to the economic, social and cultural needs of those who live in the forest;
- Foster enabling environments for supervised production of sustainable volumes and quality of forest products that will create national wealth and contribute to food security

Legal and Regulatory Framework

Legislations governing environment issues are found as Acts enacted in parliament. The legislations of the various government line ministries or institutions include the following.

Environment Protection Agency Act, 2008

The EPAA 2008 is the government of Sierra Leone's overarching legislation that deals with the protection of the environment. The Environment Protection Agency was established with a Board of Directors set up as its governing body. The control and supervision of the Agency is the responsibility of the Board, which acts in liaison and co-operation with other government agencies. The general administrative functions of the Board as stipulated by the EPAA, 2008 include the following:

- Promoting effective planning and the management of the environment;
- Coordinating and monitoring the implementation of national environmental policies relating to Sierra Leone;
- Providing policy guidance and advice to ensure the efficient implementation of the functions of the Agency so as to enhance its overall performance;
- Facilitating cooperation and collaboration among Government Ministries, local authorities and other governmental agencies, in all areas relating to environmental protection;
- Coordinating environmentally related activities as well as serving as the focal point of national and international environmental matters, relating to Sierra Leone.

Part IV of the EPAA, 2008 exclusively deals with the activities and requirements of an EIA. This part of the Act emphasizes the processes and procedures leading to the acquisition of an environmental license with respect to the conduct of fully acceptable EIA studies. It further stipulates the duties and obligations of both the environmental licenses' holder and the Board of Directors in the event that an environmental license is granted. The 2010 amendment focused on the duties and responsibilities of the EPA. In compliance to this legal instrument, this environmental impact assessment has been undertaken. This ESHIA has been prepared in compliance to the EPA Act of 2008 and its amendments in 2010.

The Environmental Protection Agency (Amendment) Act 2010

This Act entails the amendments made to the Environmental Protection Agency Act, 2008. The content of the amendment act is limited to the administration designation of the Agency's Board Members and the Management.

The Environmental Protection Agency Act 2008: (Act No. 11 of 2008) – The Prohibition of Ozone Depleting Substances Regulation 2010

This is a statutory instrument No. 13 of 2010. The instrument entails regulations set by the Agency that prohibits the importation, sale, distribution, and installation of Ozone Depleting Substances (ODS) with effect from 1 April 2011.

The Environmental Protection Agency Act 2008: (Act No. 8 of 2008) - The Environment Impact Assessment License Regulations 2010

This is a statutory instrument No. 14 of 2010. The instrument entails procedures set by the Agency for the application of an EIA License and the license fees.

These documents are available locally and can be obtained from the institutions to which the Acts refer, for consultation by potential users of the land, whose activities may have an effect on the environment.

The Forestry Act 1988

This Act came into operation on 1st July, 1988 and the Chief Conservator of Forest, with the directives of the Minister, is responsible for the implementation of its regulations. He therefore has the role of preserving 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.

***Details Required for Concession Areas***

Subsection 2 of Section 18 of the Forestry Act 1988 states that every agreement shall therefore:

- Describe the area included in the forest by reference to geographical features, markers, co-ordinates and measurement, and indicate the same on a map of suitable scale, which shall be annexed to the agreement;

- Describe the forest resources and potential of the area. Indicate the purpose of the forest, such as supply of fuel; building poles; production of commercial timber; and protection of soil and water supplies;

- Contain a detailed inventory of any rights that will be suppressed upon the constitution of the forest, and provide for adequate compensation for such rights, either in money or through the allocation of equivalent rights in other land within the chiefdom;

- Contain a list of existing rights that will be confirmed by the agreement; and

• Be valid for such period not exceeding 99 years as is reasonable, in view of the purpose for which the forest is to be constituted.

In this Act, part VI, section 21 subsection 2 indicates that no protected forest may be cut, burned, uprooted, damaged or destroyed, except with a written permission from the Chief Conservator of the forest. Removal of a national or community forest by whatever means, without legal permission, is an offence punishable with a fine not exceeding ten thousand Leones or a term of two years imprisonment or both.

***Reforestation Fee***

In taking cognizance of the importance of conserving the environment, the Act has ruled in section 17, that any one permitted to fell timber is liable to paying a reforestation fee. The fee is based on the quantity of timber felled or extracted, and the rate is to be prescribed by the Minister. The fee, which is to be paid to the Chief Conservator, will be paid into a reforestation fund established under the Act. However, at the end of any mining operation, if the mining company embarks on reforestation, and satisfies the Chief Conservator, then the fee previously paid for reforestation, will be refunded.

The Forestry Regulation 1989

These regulations are deemed to have come into force on the 1st July, 1990. The Chief Conservator holds the same responsibilities as he does for the Act of 1988 being the head of Forestry Division.

Generally community forests are managed by the Forestry Division or by agreement with the Division; it could be managed by the local government; or Community Forest Association. Based on this responsibility of the Division, no protected forest shall be tampered with in any way as is stated in section 21, subsection (2) of the Forestry Act - 1988, without written permission from the Chief Conservator of the forest.

As a method of environmental protection, it is stated in section 38 of part XI, that no land between the high and low water marks, nor those above the high water mark on both sides of the bank of any waterway, covering a distance of one hundred feet (approx.. 33 m), shall be cleared of any vegetation except permitted by a clearance license.

Sacred bushes are protected by the stipulated regulations of section 40, whereby clearance of vegetation from land designated as sacred bush, is prohibited except by clearance authority from the Chief Conservator.

REWILDING MAFORKI LTD will in no way violate provisions of the Forestry Act and Regulation. The activities of REWILDING MAFORKI LTD directly complements provisions of this law.

The Wildlife Conservation Act 1972

The Wildlife Conservation Act, 1972 and the Forestry Act, 1988 are the main legislations that deal with issues of Biodiversity Conservation in Sierra Leone. It provides for the establishment,

conservation and management of National Parks, Game Reserves and other forms of Natural Reserves.

As in the case of the Forestry Act of 1988, this Act clearly defines the roles and responsibilities of various personnel in administering the Act.

It gives the Chief Conservation of Forest the authority to execute the directives of the Minister of Agriculture in establishing a Strict Natural Reserve, a National Park and a Game Reserve. It also stipulates that in the process of establishing a reserve or a national park, the Minister should appoint a Reserve Settlement Officer who will investigate claims and rights issues of affected communities.

Specific provisions dealing with the protection, management and conservation of these areas and the limitations therein are highlighted in Part II of the Act and include the following:

- Prohibition of all forms of hunting, capture and other activities leading to the injury of wild animals;
- Destruction of any plant form by any means including fire;
- Fishing within these protected areas;
- Erection of structures, construction of dams, forestry, agriculture, mining or prospecting activities; and
- Introduction of species from outside of the boundaries of the reserve.

The Act however gives Chiefdom Councils the authority, albeit with approval from the Minister, to declare an area a Game Sanctuary or reverse the declaration of a Game Sanctuary. Further modifications to the legalese relating to the hunting of animals are made in the Act, to include any willful disturbance, molestation and intent to kill.

Part III puts strict limitations on hunting of species generally (not limited to reserves and parks), and the categories of animals as prescribed in the schedules.

The Wildlife Conservation Act of 1972 saw minor amendment in 1990 (known as the Wildlife Conservation Amendment Act), which included redefinition of terms, and other modifications and qualifications. For example, the prohibition of hunting of elephants which was limited to protected areas in the 1972 Act was extended to include all forests. The 1990 Amendment Act provided for change of name from Forestry Department to Forestry Division. Despite the minor amendment the Wildlife Conservation Act of 1972 along with the Forestry Act of 1988 continue to be the main legislature for biodiversity conservation in Sierra Leone.

The Wildlife Regulations of 1997 however makes provision for the acquisition of licenses or permits for hunting in such designated areas and for other purpose as may be prescribed.

Such licenses and permits can be revoked by the Chief Conservator of Forest if the holder fails to comply with related provisions made in the regulations.

The Draft Wildlife Regulation 1997

The Wildlife Regulation came in to force in 1997. It describes Wildlife Conservation Estate as areas described under the 1972 Wildlife Conservation Act as a National Park, Game Reserve, Strict Natural Reserve, Game Sanctuary or Non-hunting Forest Reserve. The regulation prohibits all unlicensed hunting with a Wildlife Conservation Estate to include the removal of honey. It prohibits the hunting of young and immature wild animal or bird; female wild animal accompanied by its young; and birds which are apparently breeding. It also prohibits dazzling of birds and animals.

The regulations stipulates that a license or permit should be sought before any form of hunting of game and bird can be done as required by Section 33 and 34 of the Act. The regulation also states that such licenses and permits can be revoked by the Chief Conservator of Forest if the holder fails to comply with the provisions of the regulations.

The Labour Act, 2003 (Act 651)

Section 118(1) of the Labour Act 2003 (Act 651) stipulates that it is the duty of an employer to ensure that every worker employed works under satisfactory, safe and healthy conditions. Act 651 contains a number of specific provisions relating to an employer's duty to its workers. These include providing and maintaining "at the workplace, plant and system of work that are safe and without risk to health" and taking "steps to prevent contamination of the workplaces by, and protect the workers from, toxic gases, noxious substances, vapours, dust, fumes, mists and other substances or materials likely to cause risk to safety or health". A worker is required to report situations that he believes may pose "an imminent and serious danger to his or her life, safety or health". All workers or staff employed during the operation of this facility would be provided with necessary opportunities provided in this law. Contractors would be mandated to implement provisions of this law during their work or with sub-contractors.

Workmen's Compensation Law

It is to provide for the payment of compensation to workmen for personal injuries caused by accidents arising out and in the course of their employment. The tenets of the law places a large share of the burden of supporting workers injured at the workplace on the shoulders of the employers. All workers or staff employed during the operation of this facility would be provided with necessary opportunities provided in this law. Contractors would be mandated to implement provisions of this law during their work or with sub-contractors.

The Fire Precaution (Premises) Regulations 2003

The Fire Precaution (Premises) Regulations 2003 (LI 1724) requires all premises intended for use as workplaces to have Fire Certificates. These waste transfer centers would be provided with requisite fire prevention facilities and staff trained on fire prevention and safety. REWILDING MAFORKI would work in partnership with the National Fire Force.

Local Government Act, 2004

This Act deals with the establishment and operation of local councils around 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 programmes 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. Many companies 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 company operates. It is advisable for companies 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. This project is in line with the development plans of the Port Loko District Council.

The Sierra Leone Small and Medium Enterprises Development Agency Act, 2016

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.; design and implement development support programmes and schemes for Small and Medium Enterprises; organize and encourage participation of Small and Medium Enterprises in trade, industrial and entrepreneurship development. This project is line with provisions of this act as it provides the enabling environment for young entrepreneurs to invest in oil palm business as out growers.

Institutional Context (Ministries, Department and Agencies)

Ministry of Environment

The Ministry for the Environment is the Government's primary adviser on the Sierra Leone environment and international matters that affect the environment. The Ministry also has a growing leadership role in relation to sustainable development. The Ministry advises on national environmental priorities and provides national direction, including through national policy statements, national environmental standards and other regulations. The Ministry works closely with other government agencies that have responsibilities for environmental management and with local government.

The ministry seeks to achieve:

- Sierra Leone's air, water, land and built communities are healthy.
- Risks to people, the economy and the environment from pollution, contamination and other environmental hazards are minimized.
- Sierra Leone is able to capitalise on its natural environmental advantages.
- Sierra Leone's natural resources are managed effectively and Sierra Leoneans are encouraged to use resources sustainably.

Ministry of Agriculture, Forestry and Food Security (MAFFS)

The management of Sierra Leone's agricultural resources is within the purview of the Ministry of Agriculture, Forestry and Food Security (MAFFS). It is headed by a Minister, assisted by a Deputy Minister. The Ministry has four divisions, Crops, Livestock, Forestry and Land and Water Development, all headed by Directors. Its administrative wing is headed by a Permanent Secretary. The MAFFS's mission is to "Develop policies and programmes for the systematic and economic exploitation of resources pertaining to the ministry as well as formulate appropriate regulations for the agricultural industry and related activities to ensure that the nation derives maximum benefit from the resource sector."

The work of several Ministries, Departments and Agencies (MDAs) also impacts on that of the MAFFS to varying degrees. These include the Ministry of Finance (fiscal and tax matters), the Ministry of Lands, Country Planning and the Environment (MLCPE), the Ministry of Local Government and Community Development (communal lands) and the Ministry of Works, Housing and Technical Maintenance (MWHTM).

The following institutions operate in the agricultural sector in Sierra Leone:

• Crop Division of the MAFFS – responsible for the distribution of planting materials, identification of improved variety and crop protection (Phytosanitary Sub-division);

• Forestry Division of the MAFFS – responsible for the demarcation and protection of forest reserve;

• Wildlife and Conservation unit under the Forestry Division of the MAFFS – protection of wildlife;

• Land and Water Development Division (LWDD), now Agricultural Engineering Division of the MAFFS – responsible for improving the conservation and effective use of land and water resources, and mechanization amongst other functions;

Ministry of Lands, Housing and Country Planning

The overall goal of the Ministry as reflected in its Mission Statement is:

"The achievement of effective and efficient land management patters through development control and enforcement for the attainment of a well-planned urban environment for sustainable social and economic development in Sierra Leone."

The Ministry is charged with the responsibility of ensuring effective access to land and sustainable management of all land resources, through the following activities:

- Administration of all State/Public Lands
- Acquisition of Property and the payment of compensation
- Undertaking of National Lands Surveys and Mapping
- Licensing of Land Surveyors and verification of Survey Plans
- Maintenance of up-to date Scientific Data, Maps and Plans
- Production of Geographic Database and Land Information Systems
- Preparation of Town Planning Schemes and Land Development Standards
- Approval of Settlement Development Plans
- Preparation of Development Control guidelines and procedures
- Undertake the Enforcement of Town Planning and Building Codes
- Issuance of building permits

Ministry of Labour, Employment and Social Security

The mission statement of the Ministry is as follows: "to administer labour and social security , maintain cordial industrial relations, ensure occupational health and safety at work places and to create employment opportunities to reduce poverty''.

The legal instruments governing the work of the Ministry are:

- The Industrial Relations Act 1971

- The Factory Act of 1974
- Employer/Employee Act, CAP.212
- Trade Unions Act
- Registration of Employees Act
- Workmen's Compensation Act

The Ministry is responsible for employment and labour-related activities, social security and industrial relations on behalf of the Government. Its primary responsibilities include:

- Labour, manpower planning and human resource development
- Macro-economic policies and institutional constraints on employment
- Sectoral emphasis on the needs of disadvantaged groups
- Employment and labour market policies
- Promotion of self-employment and income generating activities for youths in Sierra Leone
- Work Permit Bureau
- Workers' compensation
- Wages and labour inspection
- Industrial Court
- Relations with industrial and trade organizations
- Promotion of competitive and efficient labour market
- Occupational safety and health
- Factory inspections
- Factory Inspectorate, Factories Appeal Board
- Industrial training and trade testing
- Social security and safety net scheme

Ministry of Transport and Aviation (MoTA**)**

This Ministry is mandated to deal with issues related to transport on land, air and sea as well as local and international communications. Transport sector contributes to habitat fragmentation and loss as well as the introduction of pollutants into the environment. The Ministry oversees the Sierra Leone Roads Authority (SLRA), Sierra Leone Road Safety Authority (SLRSA) and the Sierra Leone Road Transport Corporation (SLRTC).

Ministry of Social Welfare

The ministry is mandated to promote and protect the welfare of women, children, the aged, persons with disability, and other vulnerable groups through development and review of policies, advocacy

coordination with stakeholders, building capacity and effective monitoring and evaluation in order to enhance equity for all.

The Ministry of Trade and Industry

The Ministry of Commerce is headed by a Minister, assisted by a Permanent Secretary. The Ministry is responsible for the development, implementation and evaluation of Government's trade policy. Accordingly, he is responsible for:

- the development, implementation and evaluation of strategies for promoting Sierra Leone products;
- the promotion and defence of quality control for export products;
- search for new markets for Sierra Leone;
- monitoring of international trade on national agricultural produce;
- control of compliance with standards regarding importation, in conjunction with the Minister in charge of standardization;
- development of regulations regarding prices and ensuring their application;
- promotion and control of healthy competition;
- organization and supervision of trade fairs;
- development of standards of measure, quality control instruments
- negotiation and follow-up of the implementation of the trade agreements;
- follow-up of trade statistics;
- follow-up of relations with international organizations operating in the domain of international trade; • development or homologation of standards of presentation, conservation and distribution of convenience goods and ensuring that economic operators comply with standards, in collaboration with the Minister in charge of standardization;
- imposing sanctions in the event of fraud or non-compliance with set standards;
- promotion of the competitiveness of Sierra Leone products on foreign markets.

Ministry of Local Government and Rural Development

The Ministry of Local Government and Rural Development (MLGRD) exists to promote the establishment and development of a vibrant and well-resourced decentralized system of local government for the people of Sierra Leone to ensure good governance and balanced rural based development.

International Conventions and Agreements

Sierra Leone is a signatory to a number of international Conventions and Agreements and these Conventions and Agreements need to be strictly observed for any relevant provisions applicable to the Project. The most important ones are listed below.

United Nations Convention on Biological Diversity (CBD)

The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, is an international legally binding treaty adopted in Rio de Janeiro in June 1992. The Convention has three main goals:

• Conservation of biological diversity (or biodiversity);

• Sustainable use of its components; and

• Fair and equitable sharing of benefits arising from genetic resources

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often considered as the key document regarding sustainable development. The Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993. This convention was ratified by Sierra Leone on 12 December, 1994.

United Nations Convention to Combat Desertification

The United Nations Convention to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa, is a Convention aimed at combating desertification and mitigating the effects of drought through national action programmes that incorporate long-term strategies supported by international cooperation and partnership arrangements.

The Convention, the only one stemming from the direct recommendation of the Conference's Agenda 21, was adopted in Paris on 17 June 1994 and came into force in December 1996. It is the first and only internationally legally binding framework set up to address the problem of desertification. The Convention is based on the principles of participation, partnership and decentralization - the linchpin of good governance and sustainable development. It now has 193 country Parties to the Convention, giving it truly global scope.

United Nations Framework Convention on Climate Change – UNFCCC

The UNFCCC is an international environmental treaty drafted at the United Nations Conference on Environment and Development (UNCED), otherwise known as the Earth Summit, held in Rio de Janeiro from 3 to 14 June 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The UNFCCC was opened for signature on 9 May 1992, after an Intergovernmental Negotiating Committee produced the text of the Framework Convention as a report following its meeting in New York from 30 April to 9 May 1992. It came into force on 21 March 1994. As of December 2009, UNFCCC had 192 parties.

Kyoto Protocol

The Kyoto Protocol is the protocol to the United Nations Framework Convention on Climate Change (UNFCCC or FCCC) aimed at fighting global warming. The UNFCCC is an international

environmental treaty whose goal is to ensure the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan, and entered into force on 16 February 2005. As of November 2009, 187 States had signed and ratified the protocol. Sierra Leone is also signatory to the Kyoto Protocol which entered into force in February 2005.

Convention of the International Trade of Endangered Species (CITES)

The requirements of this convention became effective in Sierra Leone on the 16th January, 1995. The convention seeks to eliminate and/or reduce trade in certain species inclusive of those that are considered endangered. By this convention, a list has been produced comprising species that require protection against trade. The majority of the species listed in CITES, are those also considered by the International Union for Conservation of Nature and Natural Resources (IUCN), as endangered and threatened. CITES also takes cognizance of species not necessarily threatened, but which require trade control to protect them from being threatened or endangered.

The Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty that aims to eliminate or restrict the production and use of persistent organic pollutants (POPs) - chemicals that are persistent bio-accumulates found in fatty tissues and are bio-magnified through the food chain, and adversely affect health and the environment. This Convention was adopted on the 22nd May, 2001 in Stockholm and Sierra Leone became a signatory on the 27th August, 2001. The convention came into force on 17 May 2004 with ratification by an initial 128 parties and 151 signatories. Co-signatories agree to outlaw nine of the dozen dirty chemicals, limit the use of DDT to malaria control, and curtail inadvertent production of dioxins and furans. This Convention recommends the elimination or restriction of production and use of all internationally produced POPs (i.e. Industrial chemicals and pesticides), particularly, Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexa-chlorobenzen (HCB), Mirixtexaphene, Polychlorinated Biphensylsis (PCBs). The convention also seeks continuing minimization and, where feasible, ultimate elimination of the releases of POPs, such as Dioxins and Furans. Wastes containing POPs, must be managed and disposed of in a safe, efficient and environmentally friendly manner, with regards for international rules, standards and guidelines.

Vienna Convention for the Protection of the Ozone Layer

The Vienna Convention was signed in 1985. It includes the Montreal Protocol on Substances that Deplete the Ozone Layer which was signed in Montreal in 1987. The Vienna Convention for the Protection of the Ozone Layer is a Multilateral Environmental Agreement. It was agreed upon at the Vienna Conference of 1985 and came into force in 1988. It acts as a framework for international efforts to protect the ozone layer. However, it does not include legally binding reduction goals for the use of CFCs, the main chemical agents causing ozone depletion. These are set out in the accompanying Montreal Protocol.

Montreal Protocol

The Montreal Protocol on Substances that Deplete the Ozone Layer (a protocol to the Vienna Convention for the Protection of the Ozone Layer) is an international treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion. The Treaty was opened for signature on 16 September 1987, and entered into force on 1 January 1989, followed by a first meeting in Helsinki in May 1989. Since then, it has been revised seven times, in 1990 (London), 1991 (Nairobi), 1992 (Copenhagen), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), and 1999 (Beijing). It is believed that adherence to the international agreement will lead to the recovery of the ozone layer by 2050.

Rotterdam Convention

The Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, commonly known simply as the Rotterdam Convention, is a multilateral treaty to promote shared responsibilities in relation to the importation of hazardous chemicals. The Convention promotes the sharing of information and calls on exporters of hazardous chemicals to use proper labelling, include directions on safe handling, and inform purchasers of any known restrictions or bans. Parties can decide whether to allow or ban the importation of chemicals listed in the Convention, and exporting countries are obliged to ensure compliance by producers within their jurisdiction.

Ramsar Convention

The Convention on Wetlands of International Importance, commonly known simply as the Ramsar Convention, is an international treaty for the conservation and sustainable utilization of wetlands, i.e. to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.

International Standards and Guidelines

REWILDING MAFORKI does not yet have a formal environmental management policy or Environmental Management System, but indications are the company is strongly committed to social and environmental sustainability and the development of an EMS and policies. However, REWILDING MAFORKI has expressed willingness to be guided by the recommendation issued World Bank and International Finance Corporation (IF C) Standards and Guidelines.

# CHAPTER 4: ANALYSIS OF PROJECT ALTERNATIVES

In this chapter we examine the alternatives to the project in respect of the project objectives, its design, key operational activities, site location, climate, scale of planting, land zoning etc. In undertaking this analysis, the consultants have also taken into account various baseline information such as soils, hydrology, water catchment areas, groundwater, topography, tree species, stakeholder involvement and interests etc. By adopting this approach, the basis for necessary mitigations and future compliance monitoring is established.

## Comparison of Project Objectives

The table below compares the main objectives of REWILDING MAFORKI's project in Port Loko District alongside that of the Forestry Division of the Ministry of Environment and our key observations.

| REWILDING MAFORKI | Forestry Department | Key Observation |
|---|---|---|
| To support the Forestry Division's goal of promoting tree plantation development as a means of re-afforesting degraded areas. | Reforestation of the reserve, protection of the catchment of rivers; serve as barrier to the dry harmattan winds, conservation of flora and fauna and reduction of forest fires | In its current form, the objective will not be achievable in the foreseeable future without any interventions. The project areas are mostly degraded areas and bare farm lands |
| To establish plantation forestry and timber crops for carbon market and the production of wood biomass, poles, sawn timber and other wood products; | To support the creation of a timber products, supply chain to support community and national development | The current condition of project areas makes it impossible to provide variety of products in substantial quantities |
| To bring substantial economic, social and environmental benefits to the communities associated with the business; | To generate revenue for landowners | In its current form, the degraded areas cannot provide any significant revenue; if any at all |

## Initial Project Adoption Considerations

In examining the initial alternatives to the project, we have identified the following below:

a) **Leave the land as it is:** This option would result in further degradation of these areas due to increased deforestation and land degradation and cattle grazing. Following discussions with local farmers and the chiefs, it was identified that continued encroachment by illegal migrant farmers could lead to undesirable social conflicts. It also exposes the area to increased risks from fire and fire spread; usually caused by migrant farmers attempting to clear grassland for farming. This alternative was found to be contrary to the wishes and interests of the landowners who lack the capacity to develop these areas.

b) **Convert the degraded areas into agricultural lands**: This option would inevitably require a change in the land use of the area.

c) **Reforestation of the land area**: This is the most desirable option for the landowners, local populace and Forestry Department. Reforestation projects require significant investments of capital and modern technology to ensure that the project site can generate positive impacts on the local community. The plantation development model proposed by REWILDING MAFORKI is one has the potential to provide jobs for some of the locals, contribute to the socio-economic development and ensure stakeholder participation in the sharing of the long-term financial benefits accruable from the project.

Analysis of Project location

The location of a suitable site for plantation development is a major undertaking for any reforestation project. In such situations, the emphasis is on ensuring that soil types and climatic conditions (rain, temperature and relative humidity) are favorable for supporting tree growth. The proposed site is suitably located in a region that has high levels of annual rainfall albeit the trend is now moving towards slightly more dry conditions. This level of rainfall is perfectly suited for the development and growth of tree species. By locating the project in these areas, access to labour resources is more assured, travelling distances to the company's allocated compartments is optimum and access to support services such as fuel, labour, water, hospitals, housing and social amenities is made more available than would have been the case if the project had been located elsewhere in the area. By locating the project in these areas, interventions such as fire management, tree planting, controlled community farming, monitoring of the plantation and stakeholder collaborations serve to create a more collaborative approach between all stakeholders to support the much need national policy of ensuring the regeneration of degraded areas.

Analysis of Topography, Soils and Land Use

The general fertility of the soils; as depicted in the baseline section of this report; is one that will generally support tree and plant growth. Similarly, the soils also support the growth and development of agricultural produce such as maize, cassava and plantain; as evidenced by the existence of many plantain and maize farms in the reserve. This raises the issue of what is the best land use option for the land allocated to REWILDING MAFORKI by the community. With the

climate gradually shifting towards drier conditions; as depicted by the rainfall statistics, the land use has to be of the type that will not be detrimental to the site. Whilst agricultural production might require some level of irrigation and intensive application of fertilizer and other soil amelioration treatments, tree planting has the capability of nutrient recycling that will not require much artificial fertilization. Traditionally, farming land in the area is created by torching the vegetation. This has been the cause of many forest fires that have engulfed the areas in the last 30-40 years. The resultant effect has been fires that have run out of control, burnt for weeks, severely degraded the community farm lands and caused heavy smoke pollution in the community and surrounding areas.

Analysis of choice of species

The choice of species for plantation development is a very important factor in plantation development projects. Factors such as soils, site and species matching are all important considerations in deciding which species is suitable for a particular project.

Rewilding

Species planted are *Terminalia Superba*, *Terminalis ivorensis* and *Nauclea diderrichii* in the rewilding sections. The trees are spaced at 4 metres by 4 metres due to the high biomass accumulation of the native species. *Terminalia superba, Terminalis ivorensis* and *Nauclea diderrichii* have been planted in the already established plantations in Maconteh and Kasseh over 232 ha. Ideally, for a successful rewilding project, more than five species are required to be planted in an area. A detailed planting plan including the exact species for the rewilding is yet to be availed. For a restoration project, only native species should be planted, adaptive to the local agro-ecological zone, in a proper mix that mimics natural conditions. This information is key for comprehensive carbon estimations. Rewilding Maforki/BKM seeks to establish its own tree nurseries to sustain the supply of the quantity required from 2023 with the support of Njala Seed Bank as well as improve the diversity of the rewilding zones.

Analysis of nursery location

The company has established a permanent central nursery to produce seedlings. Alternatively, the company could have sourced the seedlings from commercial nursery operators in Sierra Leone. The problems associated with the second option are:

- ✓ the inability to trace the sources of the seeds and
- ✓ difficulties in obtaining information on the characteristics of the tree.

Without such information, there is a risk that REWILDING MAFORKI would be unable to meet its planting objectives which could impact negatively on its investment and financial forecasting. As an alternative the company could have employed the use of small *temporary or flying* nurseries located close to the planting areas. Despite the obvious advantage of reducing cost of transportation to planting sites. In terms of cost per seedling, the use of a central nursery tends to have lower costs; especially due to high survival rate and maximization of equipment use. There is also better controlled supervision of the development of the seedlings. Another advantage of the central nursery is that it is easier to deal with management of waste and application of agro-chemicals. REWILDING MAFORKI's decision to have a central nursery will improve the company's ability to deal effectively with environmental and technical issues associated with nursery establishment.

*Water extraction for nursery:*

Sustainable supply of water is one of the pre-requisites of a successful tree nursery. REWILDING MAFORKI intends to extract water from a bore hole. However, groundwater recharge is mainly in the rainy seasons. During the rainy period, large volumes of runoff flow into streams. Therefore, it would be more prudent to extract more water from the stream in the rainy season compared to groundwater. This calls for regular monitoring of the surface water quality. Thus when surface water quality is good, it would be appropriate to extract water from the streams in the rainy season and from groundwater in the dry season. To manage the water supply situation, it will be important to monitor some environmental variables.

Analysis of land preparation options

Land preparation as part of plantation establishment is done to facilitate easy access to the soil for planting and to ensure high survival rate and early growth. Generally, land preparation involves removal of vegetation, removal of tree stumps and breaking of the ground either by pitting or ploughing. The methods and equipment's used for any of these activities are determined by factors such as condition of vegetation, tree sizes and population, topography and other terrain conditions and the special tillage needs of the species to be planted. In most cases there will be the need for combination of manual and mechanized methods. The guiding principle is always to aim doing the minimum necessary and in the cheapest way.

The following alternative suggestions are therefore presented:

1. Land clearing / preparation must be done by initial slashing when the grass is tall and wait for re-growth..
2. Planting holes measuring about 20 cm diameter and 20 cm deep are dug at the planting points for the planting of the seedlings.
3. Mechanical pitting method can be used to accelerate the rate of planting on shallow and deep soils.
4. REWILDING MAFORKI may apply herbicides, pesticides and fertilizers. Application of herbicides and pesticides should be limited to 20m or more from water bodies to reduce their harmful effects on aquatic organisms and fauna surrounding the banks of streams.
5. Burning of vegetation as a means of land clearing may not be encouraged for the obvious reason of the likelihood of the fire getting out of control to burn unintended areas and also polluting the air with smoke.

Analysis of planting options

To maximise the number of plants per unit area; as well as give adequate growing space for individual trees, planting is usually laid out by rows and spacing between trees. The rule of thumb is that planting method should be simple, easy to apply, and practicable on the type of terrain. Other factors to be considered are whether planting and harvesting will be manual or mechanized or a combination of the two.

In Sierra Leone, manual planting is the general practice due to lack of the right equipment and skills for mechanised planting. If REWILDING MAFORKI should apply only manual methods, many sites with shallow soils will be left unplanted; thus reducing the net area planted.

In conclusion it is noted that because close spacings are extremely expensive and very wide spacings grossly under-utilize a site; the spacing must be chosen based on product mix, anticipated stem size and length of rotation of the tree species.

Analysis of Tending options

Tending refers to the various silvicultural operations that are performed after planting to aid the planted seedlings to grow up to maturity and attain the required stem form. These operations include weed control, singling, and pruning.

Weed control will be needed in the first few years after planting till the stand achieves canopy closure. The methods of weed control to be considered are: manual, mechanized and chemical. Selection of these methods and intensity of application should be based on environmental, social and cost considerations. For instance, while the manual method will be socially advantageous because it will offer more employment it tends out to be expensive because it is labour intensive as compared to chemical and mechanical control.

Singling is an operation done in the first few years after establishment to reduce the number of shoots that might sprout from planted stumps or when a stem forks very close to the ground.

Pruning may be done on all trees in a stand, or only on some and sometimes not at all. The amount of pruning needed depends on the natural pruning characteristics of a species. It is also influenced by the purpose or reason for the pruning; which then determines the pattern of pruning.

### Analysis of Thinning Options

Thinning is one of the major operations detailed to be undertaken in the maintenance and management of REWILDING MAFORKI plantation. It will be undertaken for the following purposes:

a. To reduce the number of trees in a stand so that the remaining ones have more space for crown and root development and to encourage stem diameter increment and so reach a usable size sooner;
b. To remove dead, dying, diseased, and any other trees which may be a source of infection or cause damage to the remaining healthy ones;
c. To remove trees of poor form (crooked, forked, roughly branched etc) so that all future increment is concentrated only on the best trees;
d. To favour the most vigorous trees with good form which are likely to make up the final crop
e. To provide an intermediate financial returns from sales of thinning material.

It is obvious that REWILDING MAFORKI may undertake thinning for a combination of the above purposes but it is clear that most of the thinning will be for intermediate returns. The important decisions to make will be the thinning weight (Total removal per cycle), intensity of thinning (volume removed $m^3$/ha/yr) and the method of thinning so as to achieve the objective of the operation. The time for first thinning should be guided by the time canopy closure is achieved in a stand. The thinning weight should also be guided by the rate of stem increment or volume increment per hectare per year. It is also important to ensure that thinning is not delayed such that the retained trees will not take a longer time to respond positively to the changes in canopy opening.

### Pests and disease control

In protecting planted trees from pests and diseases, the company will have to adopt strategies that will ensure prevention, early detection, and application of the appropriate measures for controlling pest and diseases. The recommended approaches should be as follows:

a Selecting species that are known to be resistant to potential damaging insects and diseases prevalent in the site;
b Fixing a rotation age that will not allow the trees to become over mature and highly prone to insects and diseases;
c Thinning early and applying other practices of good forest hygiene to remove materials which would create centers for infection;
d Monitor tree appearance to detect changes in leaf color, presence of insects etc and reporting to specialists for investigation and;
e Exploring the use of chemical and cultural controls

Management of Stakeholder Relationships

The REWILDING MAFORKI project has a number of key stakeholders stated in Stakeholders group and engagement section.

These stakeholders are central to the successful delivery of the project objectives and therefore need to be managed effectively. REWILDING MAFORKI is already engaged in stakeholder consultations and has previously organized stakeholder meetings to solicit views from its stakeholders. To derive the maximum value from its stakeholder relations, it would be prudent for the company to have a dedicated Manager to manage and oversee stakeholder relations. The management process should include quarterly updates to stakeholders and regular stakeholder meetings to ensure that progress and challenges of the project are communicated and addressed. REWILDING MAFORKI should:

a Form stakeholder committees in the main traditional communities to collaborate issues of mutual concern
b Hold regular meetings with relevant Institutional stakeholders
c Provide progress updates to all stakeholders
d Solicit feedback from all stakeholders and
e Encourage active stakeholder participation in the development of the project

Environmental Monitoring

- ✓ REWILDING MAFORKI should pay close attention to soil erosion and avoid establishing plantations close to wetlands and riparian strips.
- ✓ REWILDING MAFORKI should install three automatic weather stations to monitor rainfall, wind speed, solar radiation and evaporation in the different parts of its allocated compartments.
- ✓ The water quality from groundwater and the rivers should be monitored regularly to ensure that the water quality is of a standard suitable for the development of seedlings. The risk of water contamination is high from chemicals and pathogens that may have entered the water system from upstream sources outside the reserve. To this end, water

quality parameters as stated in the hydrology section of this report should serve as a basis for future monitoring, reporting and compliance.

- ✓ REWILDING MAFORKI should provide regular updates to the Forest Services Division, Office on general activities in the plantation; in particular incidences of fire.

# CHAPTER 5: ENVIRONMENTAL BASELINE ASSESSMENT

## Location and Accessibility

### Location

The project sites are located in the Bureh, Kasseh, Maconteh, Bekeh Lokoh and Kamansondo, Chiefdoms, Port Loko District in the Northern Province of Sierra Leone. The study area is about 95 miles (124 km) from Freetown. Bureh, Kasseh and Maconteh are about 18 miles (29 km) from the district headquarter town of Port Loko and Kamansondo is about 22 miles to Port Loko Town. The project concession areas are divided into seven sections based on the seven chiefdo

The land demarcated for the project within which the study has been carried out, covers a total area of 25, 000 hectares of land. The project intends to plant a total of 19,800 hectares (ha) for rewilding and 5,200 ha for commercial purposes. Currently, 466 hectares have been planted in Maconteh and Kasseh chiefdoms since June 2022. In Maconteh, 265 ha have been established while 200 ha of the plantations have been established in Kasseh

The boundaries are irregular in shape and follow the direction of the Little Scarcies River, streams, motorable tracts and footpaths. The north western borders of two plots are close to the little Scarcies River. Both plots are lying between two streams on the west and the east by Kebinta Stream which are draining into the Scarcies River. Scattered around the surveyed project area are a number of settlements and these settlements form the focal locations within which the baseline survey for the Environmental and Social Impact Assessment was affected.

The area can mainly be accessed through a major tarmac highway and rugged laterite motorable road tracks and footpaths. From Port Loko town the project site can be accessed through the newly constructed Port Loko – Kambia highway and the Port Loko – Lungi High Way. A secondary road of less than a kilometer runs off from the main highway to link the project plots. The rest of the project area is internally accessible mainly by motorable tracks or footpaths. During the rains, especially at the peak periods some areas close to the bank of the Scarcies River are rendered inaccessible by the flood waters. Old Bantoro and Makane on the bank of the Scarcies River has a relatively short distance to across the Scarcies, but during the rains, ferrying across this river in canoes is highly dangerous due to the rise in the water volume.

## Physical and Biological Environment

For the physical and biological baseline assessment data collection was only done in Bureh, Kasseh and Maconteh Chiefdoms. No data collection was done in Bekeh Lokoh, and Kamansondo, Chiefdoms because no proper land arrangement and site assessment has been done for the project in these areas as at the time of this study. The key stakeholders in these areas informed the team that they have not agreed on any proposed land site for the project which makes it very difficult for the team to determine the projectarea of influence in these two chiefdoms. Three teams were put together to collect data in these three chiefdoms.

### Climate

Based on information available from the metrological department and other climatological studies, climatic and other data for Rokupr and Port Loko have been used to represent conditions within the project area. Generally, the climate of the project area is described as wet tropical monsoon with a single wet season each year. The average annual rainfall is about 2540 mm overall,

A summary of some climatic data for Rokupr, Port Loko and Makeni is presented in the Tables below. Both rainfall data can be used to predict future rainfall in the project area. The greater part of the rain falls between mid-April and mid-November and the wettest month is usually August, even though rivers attain maximum discharge in mid-September. There is very little rain in December, January and February. River discharge is at its lowest in March and April and begins to gradually increase in May. Groundwater levels do not rise significantly until late July.

In terms of agro climatic zonation, the project area lies almost in the transitional area between the coastal plains and savanna woodland agro climatic region which is characterized by a high mean annual rainfall of 2500 -3000 mm and moderately low (290+/-30mm) water deficit spread over some 100 - 200 days (Kowal, et. al. 1980). About half of the annual precipitation (1460 mm) finds its way to groundwater or runoff resulting in stream and river flows (Dijkerman et al, 1964). The contribution of rainfall to stream flow is prolonged, lasting from the beginning of May to the end of November.

Normal temperature range is 21ºC to 33ºC although it can drop to as low as 10ºC at night during the Harmattan season in January. Day temperatures average 31ºC in the dry season and 28ºC in the wet season (Hall, 1966). Average short-wave radiation of the season is 393 calories per cubic

**Table 5.1: Annual Water Budgets (mm) for the Savanna Woodland Agro-Climatic Region and for Rokupr *Source: UNDP/FAO- TR5, 2010***

| Budget Component | Region (savanna woodland) | Rokupr |
|---|---|---|
| Precipitation | 2280 | 3195 |
| Evapotranspiration | 1426 | 1412 |
| Water Surplus | 1359 | 2309 |
| Water Deficit | 505 | 528 |
| Effective Precipitation | 1021 | 984 |
| Growing Period Duration (days) | 255 | 260 |

the lowlands within the savanna of the Agro-climatic Region of Sierra Leone. The annual water budgets for this region and for Rokupr was used as Rokupr is the closest to the project area and the best representation for the study area (see annual water budget in Table 5.1).

In general, the contribution of rainfall to stream flow is prolonged, lasting from the beginning of May to the end of November.

***Table 5.2: Summary of some Climatic Data for Makeni (Relative Humidity), Port Loko (Rainfall), Rokupr (Temperature)***

| Climatic Variable | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monthly Mean Temperature (°C) (24yrs) Rokupr | Max | 32.47 | 100.10 | 33.37 | 33.50 | 33.70 | 32.77 | 29.07 | 28.27 | 29.50 | 30.90 | 31.50 | 31.93 |
| | Min | 19.60 | 20.73 | 21.37 | 22.50 | 22.70 | 22.00 | 22.03 | 22.17 | 22.10 | 21.83 | 21.77 | 20.37 |
| Average Relative Humidity (%) (30yrs) | 9 a.m. | 75.1 | 90.8 | 79.4 | 82.0 | 85.0 | 89.1 | 90.1 | 91.5 | 88.1 | 85.5 | 85.8 | 77.9 |
| | 3 p.m. | 41.5 | 45.7 | 44.8 | 49.6 | 60.1 | 64.2 | 73.5 | 72.0 | 71.5 | 68.8 | 63.9 | 48.3 |
| Monthly Mean of Rainfall (mm) Port Loko (15yrs) | | 1.47 | 0.23 | 8.17 | 13.50 | 55.80 | 104.03 | 147.40 | 188.77 | 138.17 | 98.13 | 37.33 | 5.67 |
| Monthly Mean of potential Evapotranspiration (mm) | | 40.00 | 40.00 | 43.67 | 47.00 | 45.00 | 40.33 | 33.33 | 31.67 | 34.00 | 39.00 | 38.00 | 37.67 |

S*ource: UNDP/FAO - TR5, 2010 & Metrological* Department

Bureh Section

*Wind Speed*

Wind speed measurements were recorded within and around twenty two locations (22) in twenty one (21) settlements all within the Bureh chiefdom of the study area. The measurements were recorded at different locations and times of the day using the portable anemometer vane probe.

Table 5.3 below shows the level of wind speed recorded during this period (1st/2/23 to 4/2/23). The figures indicate that wind speeds for this time of the year in the settlements are generally light. The values range from 0.1m/s in Rosint, Konta Ferry and Yelisanda to 1.3m/s in Magbaft.

**Table 5.3: Wind Speed Measurements for Bureh Section of the Rewilding Maforki Project Area**

| Location | GPS coordinates | Date | Time | Average Wind speed m/s |
|---|---|---|---|---|
| Mange Mori, Lower end of Mange town | 0735741/0986699 | 1/02/2023 | 13:50 | 0.7 |
| Mange Mori,Upper end of Mange town | 0735558/0986945 | 1/02/2023 | 14:20 | 0.5 |
| Kalangba | 0931100/0985321 | 2/02/2023 | 11:05 | 0.5 |
| Mateti | 0731934/0985790 | 2/02/2023 | 13:10 | 0 |
| Konta wusi | 0732626/0986109 | 2/02/2023 | 13:50 | 0 |
| Rosint | 0732270/0987826 | 2/02/2023 | 15:40 | 0.1 |
| Kupra-Wusi | 0730234/0987904 | 2/02/2023 | 17:00 | 0.4 |
| Konta ferry | 0736794/0985709 | 3/02/2023 | 10:35 | 0.1 |
| Yelisanda | 0736225/0984562 | 3/02/2023 | 12:10 | 0.1 |
| Yongro | 0736696/0984403 | 3/02/2023 | 13:00 | 0.7 |
| Masaibu | 0737871/0984117 | 3/02/2023 | 13:55 | 1 |
| Cimbeck/ Makama (old town) | 0739112/0982302 | 3/02/2023 | 15:15 | 0.5 |
| Mamaka | 0739685/0979396 | 3/02/2023 | 16:45 | 0.8 |
| Magbafti | 0735576/0989005 | 4/02/2023 | 11:07 | 1.3 |
| Masimera | 0738641/0980880 | 4/02/2023 | 12:10 | 0.7 |
| Masisi | 0737714/0980116 | 4/02/2023 | 13:10 | 0.2 |
| Mangata | 0737110/0978283 | 4/02/2023 | 14:25 | 0.6 |
| Gbela | 0736727/0981408 | 4/02/2023 | 16:15 | 0.2 |
| Making | 0741871/0980068 | 4/02/2023 | 17:12 | 0 |
| Bantoro | 0742285/0981774 | 4/02/2023 | 18:15 | 0.3 |
| Fairdugu/Forodugu | 0736959/0990239 | 4/02/2023 | 12:05 | 0.4 |
| Mayorsor | 0743909/0981925 | 4/02/2023 | 17:55 | 0.2 |

Air Quality

The quantity of dust particles in the air was recorded within and around twenty (20) settlements in the study area. The measurements were recorded at different times and durations. Readings were taken using a portable micro-dust pro aerosol monitoring system.

Table 5.4 below shows the air quality in terms of the dust particle quantity in the atmosphere at different locations. The maximum value ranges between 0.448 mg/$m^3$ at Mateti and 3.36 mg/$m^3$ at Cimbeck/Makama (old town) while the average value ranges between 0.002 mg/$m^3$ at Mateti and 1.37mg/m3 at Konta Ferry. These levels are far below the international accepted maximum permissible limits for public health. This means the settlements have an environmentally friendly atmosphere which permits healthy living conditions.

**Table 5.4: Air Quality Measurements for Bureh Chiefdom of the Rewilding Maforki Project Area**

| Location | GPS coordinates | Date | Starting Time | Duration | Average Values (mg/$m^3$) | Maximum Values (mg/$m^3$) |
|---|---|---|---|---|---|---|
| Mange Mori, | 0735741/0986699 | 1/02/2023 | 16:16:14 | 1:29:00 | 0.556 | 2.73 |
| Kalangba | 0931100/0985321 | 1/02/2023 | 11:31:20 | 0:33:30 | 0.198 | 2.8 |
| Mateti | 0731934/0985790 | 1/02/2023 | 13:33:26 | 0:22:00 | 0.002 | 0.448 |
| Konta wusi | 0732626/0986109 | 1/02/2023 | 14:19:49 | 0:32:30 | 0.406 | 2.194 |
| Rosint | 0732270/0987826 | 1/02/2023 | 16:07:11 | 0:33:00 | 0.108 | 1.385 |
| Kupra-Wusi | 0730234/0987904 | 1/02/2023 | 17:20:05 | 0:25:00 | 1.113 | 2.93 |
| Konta ferry | 0736794/0985709 | 2/02/2023 | 11:01:06 | 1:01:30 | 1.37 | 1.763 |
| Yelisanda | 0736225/0984562 | 2/02/2023 | 12:36:09 | 0:24:30 | 0.281 | 2.51 |
| Yongro | 0736696/0984403 | 2/02/2023 | 13:23:54 | 0:31 | 0.132 | 1.486 |
| Masaibu | 0737871/0984117 | 2/02/2023 | 14:21:04 | 0:19:00 | 0.526 | 1.702 |
| Cimbeck/ Makama (old town) | 0739112/0982302 | 2/02/2023 | 15:53:09 | 0:31:30 | 1.245 | 3.36 |
| Mamaka | 0739685/0979396 | 2/02/2023 | 17:09:39 | 0:28:00 | 1.06 | 2.491 |
| Magbafti | 0735576/0989005 | 3/02/2023 | 11:35:36 | 0:32:00 | 1.201 | 1.9 |
| Masimera | 0738641/0980880 | 3/02/2023 | 12:33:09 | 0:38:00 | 0.06 | 1.362 |
| Masisi | 0737714/0980116 | 3/02/2023 | 13:32:04 | 0:30:00 | 0.375 | 2.028 |
| Mangata | 0737110/0978283 | 3/02/2023 | 14:53:55 | 0:41:30 | 0.485 | 2.347 |
| Gbela | 0736727/0981408 | 3/02/2023 | 16:44:15 | 0:15:00 | 1.178 | 2.346 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Making | 0741871/0980068 | 3/02/2023 | 17:37:47 | 0:15:30 | 1.182 | 1.704 |
| Bantoro | 0742285/0981774 | 3/02/2023 | 18:42:41 | 0:14:00 | 1.247 | 2.325 |
| Fairdugu/Forodugu | 0736959/0990239 | 4/02/2023 | 12:24:00 | 0:30:30 | 0.318 | 1.673 |
| Mayorsor | 0743909/0981925 | 4/02/2023 | 18:21:30 | 0:26:30 | 0.905 | 2.99 |

*Source: Survey Data*

Noise

Noise levels were measured and recorded within and around twenty two locations (22) in twenty one (21) settlements all within the Bureh Chiefdom of the study area. The measurements were recorded at different locations and times of the day using the portable sound meter.

The noise levels range from 38.1 decibels (dB) in Mange Mori (Lower end of Mange town) to 68.98 decibels (dB) Rokupr-Wusi settlement. From the measurements recorded, the noise levels are within the World Health Organization (WHO) recommended limits, which stipulates that hearing protection gear must be used for noise exposure levels above 85 dB (see Noise level table 5.5 below).

**Table 5.5: Noise Levels for Rewilding Maforki Study Area in Bureh Chiefdom Study Area**

| Location | GPS coordinates | Date | Time | Average Peak noise level (d/B) |
|---|---|---|---|---|
| Mange Mori, Lower end of town | 0735741/0986699 | 1/02/2023 | 16:00 | 63.23 |
| Mange Mori, Upper end of town | 0735558/0986945 | 1/02/2023 | 16:25 | 38.1 |
| Kalangba | 0931100/0985321 | 1/02/2023 | 11:30 | 51.3 |
| Mateti | 0731934/0985790 | 1/02/2023 | 13:15 | 55.9 |
| Konta wusi | 0732626/0986109 | 1/02/2023 | 14:00 | 54.63 |
| Rosint | 0732270/0987826 | 1/02/2023 | 15:50 | 54.85 |
| Kupra-Wusi | 0730234/0987904 | 1/02/2023 | 17:10 | 68.98 |
| Konta ferry | 0736794/0985709 | 2/02/2023 | 11:45 | 49.93 |
| Yelisanda | 0736225/0984562 | 2/02/2023 | 12:20 | 55.2 |
| Yongro | 0736696/0984403 | 2/02/2023 | 13:05 | 45.45 |
| Masaibu | 0737871/0984117 | 2/02/2023 | 14:00 | 65.75 |
| Cimbeck/ Makama (old town) | 0739112/0982302 | 2/02/2023 | 15:28 | 65.1 |
| Mamaka | 0739685/0979396 | 2/02/2023 | 16:52 | 51.3 |
| Magbafti | 0735576/0989005 | 3/02/2023 | 11:15 | 49.3 |
| Masimera | 0738641/0980880 | 3/02/2023 | 12:16 | 48.8 |
| Masisi | 0737714/0980116 | 3/02/2023 | 13:16 | 45.28 |
| Mangata | 0737110/0978283 | 3/02/2023 | 14:30 | 48.7 |
| Gbela | 0736727/0981408 | 3/02/2023 | 16:25 | 52.33 |
| Making | 0741871/0980068 | 3/02/2023 | 17:16 | 58.28 |

| | | | | |
|---|---|---|---|---|
| Bantoro | 0742285/0981774 | 3/02/2023 | 18:20 | 48.4 |
| Fairdugu/Forodugu | 0736959/0990239 | 4/02/2023 | 12:10 | 48.53 |
| Mayorsor | 0743909/0981925 | 4/02/2023 | 18:00 | 60.5 |

*Source: Survey Data*

Maconteh Section

*Wind Speed*

Wind speed measurements were recorded within and around four locations (4) in Maconteh chiefdom of the study area. The measurements were recorded at different locations and times of the day using the portable anemometer vane probe.

Table 5.6 below shows the level of wind speed recorded during this period (2/02/23 and 5/2/23). The figures indicate that wind speeds for this time of the year in the settlements are generally light. The values range from 0.18 m/s in Mabian and Making to 0.28m/s in Malal.

**Table 5.6: Wind Speed Levels for Rewilding Maforki Study Area in Maconteh Chiefdom in the Study Area**

| Location | GPS coordinates | Date | Time | Average Wind Speed m/s |
|---|---|---|---|---|
| Malal | 0740667/0987745 | 03/02/2023 | 14:20 | 0.28 |
| Made | 0742564/0990421 | 03/02/2023 | 15:15 | 0 |
| Making | 0742624/0990891 | 03/02/2023 | 15:42 | 0.18 |
| Mabian | 0739458/0989597 | 05/02/2023 | 10:05 | 0.18 |

*Source: Survey Data*

Air Quality

The quantity of dust particles in the air was recorded within and around four (4) settlements in the study area. The measurements were recorded at different times and durations. Readings were taken using a portable micro-dust pro aerosol monitoring system.

Table 5.7 below shows the air quality in terms of the dust particle quantity in the atmosphere at the different locations. The maximum value ranges between 1.199 mg/$m^3$ at Making and 1.739 mg/$m^3$ at Malal, while the average value ranges between 0.078 mg/$m^3$ in Making and 0.451mg/$m^3$in Mabian. These levels are far below the international accepted maximum permissible limits for public health. This means the settlements have an environmentally friendly atmosphere which permits healthy living conditions.

**Table 5.7: Air Quality Levels for Rewilding Maforki Study Area in Maconteh Section**

| Location | GPS coordinates | Date | Starting Time | Duration | Average Values ($mg/m^3$) | Maximum Values ($mg/m^3$) |
|---|---|---|---|---|---|---|
| Malal | 0740667/0987745 | 03/02/23 | 14:42:34 | 0:00:38 | 0.261 | 1.739 |
| Made | 0742564/0990421 | 03/02/23 | 15:40:29 | 0:19:30 | 0.245 | 1.647 |
| Mabian | 0739458/0989597 | 05/02/23 | 10:27:41 | 0:15:00 | 0.451 | 1.624 |
| Making | 0742624/0990891 | 03/02/23 | 16:07:50 | 0:00:24 | 0.078 | 1.199 |

*Source: Survey Data*

Noise

The Noise levels were measured and recorded within and around four (4) settlements in the study area. The measurements were recorded at different times and durations of the day using a portable sound meter in settlements that are likely to be affected by the oil palm project activities. The noise levels range from 49.5 decibels (dB) in Malal to 54.5 decibels (dB) in Making. From the measurements recorded, the noise levels are within the World Health Organization (WHO) recommended limits, which stipulates that hearing protection gear must be used for noise exposure levels above 85 dB (see Noise level table 3.8).

**Table 5.8: Noise Level for Rewilding Maforki study Area in Maconteh Section**

| Location | GPS coordinates | Date | Time | Average Peak noise level (dB) |
|---|---|---|---|---|
| Malal | 0740667/0987745 | 03/02/2023 | 14:25 | 49.5 |
| Made | 0742564/0990421 | 03/02/2023 | 15:20 | 50.5 |
| Mabian | 0739458/0989597 | 05/02/2023 | 10:18 | 54.1 |
| Making | 0742624/0990891 | 03/02/2023 | 15:47 | 54.5 |

*Source: Survey Data*

Kasseh Section

*Wind Speed*

Wind speed measurements were recorded within and around seven (7) settlements. The measurements were recorded at different locations and times of the day using the portable anemometer vane probe.

Table 5.9 shows the level of wind speed recorded on the 4/02/2023. The figures indicate that wind speeds for this time of the year in these settlements are generally light. The levels range from 0.15m/s in Romeni to 0.85 m/s at Marenka while there was no wind movement in Komrabia and Rotifunk settlement at the time the measurement was recorded.

**Table 5.9: Wind Speed Measurements for Rewilding Maforki Study Area in Kasseh Section**

| Location | GPS coordinates | Date | Time | Average Wind Speed m/s |
|---|---|---|---|---|
| Gberi-Kasse | 0759364/0993353 | 04/02/2023 | 12:05 | 0.4 |
| Kagbantama | 0756036/0991331 | 04/02/2023 | 13:24 | 0.3 |
| Marenka | 0751678/0992159 | 04/02/2023 | 14:15 | 0.85 |
| Kawenga | 0750967/0994217 | 04/02/2023 | 15:01 | 0.05 |
| Komrabia | 0752161/0988498 | 04/02/2023 | 16:35 | 0 |
| Romeni | 0750880/0985069 | 04/02/2023 | 15:05 | 0.15 |
| Rotifunk | 0746124/0988203 | 04/02/2023 | 18:12 | 0 |

*Source: Survey Data*

Air Quality

The quantity of dust particles in the air was recorded within and around seven (7) settlements in the project area. The measurements were recorded at different times and durations. Readings were taken using a portable micro-dust pro aerosol monitoring system.

Table 5.10 shows the air quality in terms of the dust particle quantity at the different settlements. The maximum value ranges between 0.002 mg/$m^3$ and 15.41 mg/$m^3$ while the average value ranges between 0.002 mg/$m^3$ and 1.334 mg/$m^3$. These levels are far below the international accepted maximum permissible limits for public health. This means the settlements have an environmentally friendly atmosphere which permits healthy living conditions.

**Table 5.10: Air Quality Levels for Rewilding Maforki Study Area in Kasseh Section**

| Location | GPS coordinates | Date | Starting Time | Duration | Average Value (mg/$m^3$) | Maximum Values (mg/$m^3$) |
|---|---|---|---|---|---|---|
| Gberi-Kasse | 0759364/0993353 | 04/02/2023 | 12:25:50 | 0:00:41 | 0.232 | 15.41 |
| Kagbantama | 0756036/0991331 | 04/02/2023 | 13:48:31 | 0:20:30 | 0.002 | 0.002 |
| Marenka | 0751678/0992159 | 04/02/2023 | 14:14:19 | 0:19:00 | 0.485 | 1.998 |
| Kawenga | 0750967/0994217 | 04/02/2023 | 15:30:43 | 0:19:30 | 0.032 | 1.208 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Komrabia | 0752161/0988498 | 04/02/2023 | 17:00:14 | 0:18:00 | 1.334 | 8.08 |
| Romeni | 0750880/0985069 | 04/02/2023 | 17:30:45 | 0:34:30 | 0.916 | 3.16 |
| Rotifunk | 0746124/0988203 | 04/02/2023 | 18:38:06 | 0:14:00 | 1.234 | 1.92 |

*Source: Survey Data*

Noise

Noise levels were measured and recorded within and around seven (7) settlements in the project area. The measurements were recorded at different times and durations of the day within and around the study area that are likely to be affected by the project activities. The noise levels range from 47.8 decibels (dB) in the Kagbantama to 65.9 decibels (dB) in Kawenga settlement. From the measurements recorded, the noise levels are within the World Health organization (WHO) recommended limits, which stipulates that hearing protection gear must be used for noise exposure levels above 85 dB (see noise level table 5.11 below).

**Table 5.11: Noise Level Data for Rewilding Maforki Study Area in Kasseh Section**

| Location | GPS coordinates | Date | Time | Average peak Noise Level (dB) |
|---|---|---|---|---|
| Gberi-Kasse | 0759364/0993353 | 04/02/2023 | 12:12 | 52.9 |
| Kagbantama | 0756036/0991331 | 04/02/2023 | 13:32 | 47.8 |
| Marenka | 0751678/0992159 | 04/02/2023 | 14:22 | 65.13 |
| Kawenga | 0750967/0994217 | 04/02/2023 | 15:10 | 65.9 |
| Komrabia | 0752161/0988498 | 04/02/2023 | 16:40 | 50.9 |
| Romeni | 0750880/0985069 | 04/02/2023 | 17:10 | 53.3 |
| Rotifunk | 0746124/0988203 | 04/02/2023 | 18:17 | 53.75 |

Geology

In this area the general geology is a transition zone were the Kasila group of rocks and the bullom group of rocks tend to interact. The Kasila rocks are represented in the area by low grade metamorphic rocks such as amphibolites, minor quartz- magnetite, quartz-diopside and aluminosilicate – bearing rocks which represent highly metamorphosed equivalents of banded iron formation, marbles and pellites.

The bullom group of rocks is represented in the area by the products of the extensive weathering of the Kasila rocks. Because of this intensive weathering, it is difficult to find fresh Kasila rock samples in most areas. The aluminosilicate bearing rocks are mostly weathering to bauxite and laterite.

**Study Area**

The geology is typical to that of western portion of Port Loko District. Though outcrops are difficult to find, available rock samples reveal rocks of Precambrian age mostly gneisses and granite which are typical of the Kasila Group of rocks and the Granite Greenstone Terrain. It also has a coastal strip on its western part about 4km in width consisting mainly of marine and estuarine sediments of tertiary and quaternary to recent age.

It consists of the Achaean Basement which is subdivided into infracrustal rocks (gneisses and granitoids) and supercrustal rocks (containing Greenstone Belts).
Weathering in the area is intense and is almost obliterating meaningful rocks deposit of the Kasila and Greenstone Belt. This weathering accounts for the bauxite deposit of the Kasila in Port Loko District.

Landform

***General***

The study area falls within the dissected plains of very low relief and are generally comprising of gently undulating plains broad interfluves dissected by generally narrow valleys swamps.

**Study Area**

Landforms within the specific study area generally comprise interfluves with very gentle slopes valley swamps minor floodplains.
The interfluves are dissected by valley swamps. They can be divided into interfluves crest and interfluves side slopes. The crests are generally nearly level to very gentle, 100 to 500m wide and slightly undulating. The side slopes are medium to long, straight, gentle to locally moderate slope and slightly gullied.

The valley swamps are level to nearly level and irregular with varying widths (100 400m) and locally channeled.

The minor floodplains are level to nearly level, 40 – 500m wide, adjacent to major rivers and streams; there are discontinuous alluvial plains of variable width,

Soils

***Overview of the Soils of Port Loko District***

Generally, the district is covered predominantly by two major soil types in the uplands and an undifferentiated hydromorphic soil in the valley swamps in the lowlands. The upland soil types are very gravelly and gravel-free ferralitic soils over colluvial and residual gravel on interfluves. These soils are shallow to moderately deep in the gravelly ferralitic areas and deep to very deep for the gravel-free ferralitic. Generally, these soils are well drained, with strong brown sandy loam to gravelly sandy clay topsoil over yellowish red very gravelly sandy clay loam to very gravelly sandy clay subsoil textures in the gravelly ferralitic over colluvial and residual gravel on interfluves areas. Soils in the valley swamps are generally deep, poorly drained to waterlogged, dark gray alluvial silty loam to silty clay loam topsoil with varying levels of organic matter over mottled /or gleyed clays with light brownish gray variable texture in the subsoils. The soils in both the uplands and the valley swamps are generally strongly acid with low to very low nutrients level.

***Methodology***

The soil baseline study was done by a random survey method. Soil descriptions were done using auger borings on the different facets (smallest unit of landform) At each observation point, the soil was augered up to at least 100cm where possible and described in detail using FAO Guidelines for soil profile descriptions (FAO 1990). The parameters described are shown on the soil/landform physical properties table. Nine (9) observations were made in the Bureh Section and 4 each in Maconteh and Kasseh Sections within the study area. Generally, the soils can be classified as uplands and bottomlands. The upland soils are deep to moderately deep, gravelly and gravel-free and well drained while the bottomland is deep, generally gravel-free, poorly drained to waterlogged. Based on careful observations nine composite soil samples were collected from the top and sub soil of varied depth in the study area. Chemical analyses were later carried out on the samples for the following: pH, nitrogen, organic carbon, organic matter, phosphorus, magnesium, potassium, calcium, sodium, Cation Exchange Capacity (CEC), Base Saturation (BS), Iron, Exchangeable Aluminum and hydrogen.

***General***

From observations the soils can be divided into three types according to textural classification.

The soil types include:

- Sandy loam to sandy clay loam overlying gravelly sandy clay to very gravelly sandy clay;
- Sandy loam to Sandy clay loam overlying sandy clay to clay; and
- Silty loam to silty clay loam overlying sandy clay to clay.

Soils were defined as per the principles and criteria of the Sierra Leone Soil Rating System and further correlated with the World Reference Base for Soil Resources (FAO, 2006). The section below illustrates the physical descriptions of the various soil types.

***Physical Properties***

The physical properties of the various soils are described below:

**(a) Soils of the Sandy loam to sandy clay loam overlying gravelly sandy clay to very gravelly sandy clay**

These soils occur on the slopes and crest of the interfluves (irregular land surface) within the study area, and are generally gravel-free in the topsoil and gravelly in the subsoil:

- These soils are generally deep to moderately deep;
- Texture ranges between sandy loam and sandy clay loam in the topsoil overlying gravelly sandy clay to very gravelly sandy clay subsoil;
- They are well drained with water table below100 cm; and
- Colours are very dark brown to dark reddish brown top soil and dark yellowish brown to dark reddish brown in the subsoil.

**(b) Soils of the sandy loam to sandy clay loam overlying sandy clay to clay**

These soils also occur on the slopes and crest of the interfluves and are generally gravel-free in nature. These soils comprise the following properties:

- Deep;
- Texture are generally sandy loam to sandy clay loam in the topsoil and sandy clay to clay in the subsoil;
- Well drained with water table below 100 cm; and
- Colours are dark brown to dark yellowish brown over yellowish brown.

**(c) Soils of the Silty loam to silty clay loam overlying sandy clay to clay**

The top soils vary as some swamps were uncultivated while other swamps are presently under rice cultivation. These soils are generally gravel-free, except at the fringes were the adjacent soil textures are gravelly then there is possibility for the topsoil to be gravelly.

- Deep to moderately deep at the fringes;
- Texture is silty loam to silty clay loam in the topsoil overlying sandy clay to clay with clay content increasing with depth;
- Poorly drained to waterlogged with water table on or very close to the surface; and
- Colours are dark gray to dark olive brown over light brownish grayish to dark yellowish brown subsoil.

| Obs No. | Physiography | Landform | Soil Mapping Units | Soil Depth | Texture | Consistence | Colour | | Coarse Fragments | | $H_20$ Table | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Matrix | Mottles | Type | % | | |
| 1,4,5,6,7,8,10,13 and 14 | Upland | Soils of Interfluves (crest & Side slopes) | A | 0 - 20 | SL -SCL | SS/SP | 10YR 3/3 | - | - | - | Below 100cm | Clay and gravel content increases with depth. |
| | | | | 20 - 55 | gr SC | S/SP | 5YR 4/4 | - | Ironstone | 20 - 50 | | |
| | | | | 55-100 | Vgr SC | S/SP | 5YR 4/6 | - | Ironstone | >50 | | |

**Table 5.12: Typical Representatives of Soil/Landform Physical Properties of Rewilding Maforki Study Area in BKM Chiefdoms**

| Obs No. | Physiography | Soil/Land form | Mapping Units | Soil Depth | Texture | Consistence | Colour | | Coarse Fragments | | $H_20$ Table | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Matrix | Mottles | Type | % | | |
| 3 and12 | Upland | Soils of Interfluves (crest & Side slopes) | B | 0 - 20 | SCL | SS/SP | 10YR 3/3 | - | - | - | Below 100cm | Clay content increases with depth |
| | | | | 20 - 50 | SC | S/SP | 10YR 4/4 | - | - | - | | |
| | | | | 50 -100 | SC - C | S/P | 10YR 4/6 | - | - | | | |

| Obs No | Physiography | Soil/Land form | Mapping Units | Soil Depth | Texture | Consistence | Colour | | Coarse Fragments | | $H_20$ Table | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Matrix | Mottles | Type | % | | |
| 2,9,11 and 15 | Upland | Soils of Valley swamp | C | 0- 20 | SiL - SiCL | SS/SP | 2.5Y 3/3 | - | - | - | Below 100cm | Clay content increases with depth. |
| | | | | 20-60 | SC | S/SP | 2.5Y 4/4 | 10YR 6/8 | - | - | | |
| | | | | 60-100 | Clay | S/P | 5YR 5/3 | 2.5Y6/6 | - | - | | |

*Note: V-very, sil – silty loam SiCL - Silty Clay Loam , SCL – Sandy Clay Loam, SC – Sandy Clay, gr – gravelly, , SCL –Sandy Clay Loam*

***Chemical Properties***

Since this study was carried out to evaluate the environmental impacts for Rewilding Maforki Project the results of the chemical analyses show the current nutrient status of the soil and how readily they are available to plants. One of the main functions of soils is to provide an adequate reservoir of nutrients to plants and this depends upon the amount and nature of inorganic and organic colloids present in the soil.

The analytical interpretations are based on the fertility ratings of Sierra Leone soils "Land in Sierra Leone: a reconnaissance survey and evaluation for agriculture" 1980.

According to results the nutrient levels are generally moderate to low and vary according to the depth of the horizon. The soils have been de-saturated of almost all the essential nutrients.

The uplands from which samples were collected on the interfluve crest and slopes show moderate to low nutrient status. This is attributed to several factors like intensive cultivation and erosion which have resulted to excessive leaching coupled with the adverse effect of the traditional shifting cultivation farming methods.

This analysis was done for an average depth of 0 - 20cm, 20 – 50cm for the topsoils while the subsoil varies between 50 – 100cm and 80 - 100cm especially for the valley swamps.

The soils are generally strongly acid (pH 4.43 – 5.74) with the topsoil of the valley swamp been neutral and extremely acid in the topsoil of the interfluves crest. The acidity decreases with depth in the valley swamp whiles the upland soils are having fluctuation of acidity between the profiles.

Total nitrogen levels are generally low to moderate with values ranging from 27.3 % to 52.8 % with the highest level in the topsoil of the valley swamp. The total nitrogen level decreases with depth in all the analyzed samples.

Organic matter and carbon are generally low to very low with values ranging from 1.84 % to 12.42 % and 1.10 % to 7.45 % for organic matter and organic carbon respectively which decreases with depth.

The Cation Exchange Capacity (CEC) which is a strong determinant of soil fertility is generally moderate to high with values ranging from 11.77 Cmol/kg to 30.26 Cmol/kg with the highest level in the interfluves side slope.

The exchangeable bases (Ca++, Mg++, Na+, K+) are generally very low and decrease with depth. The level of the calcium is slightly higher than the other exchangeable bases especially in the subsoil of the interfluves side slopes.

Base saturation percentages are extremely low with values ranging from 10.05 % in the topsoil of the valley swamp to 39.02 % in the subsoil of the interfluves crest. The value normally fluctuates between the horizons.

Phosphorus values range from 0.31 ppm – 0.76 ppm, which is considered low. The lowest value is recorded in the topsoil of interfluves side slopes whilst the highest value is in the topsoil of the valley swamp.

Aluminum levels are generally low and their values range from 0.11 to 0.35 Cmol/kg soil. The aluminum levels fluctuate along the soil profile. (See analytical results of soil samples in the table below).

**Table 5.13: Analytical Result of Soils for Rewilding Maforki Study Area in the BKM Chiefdoms**

| | | | Parameters Determined in Oven Dry ( ~30 º C) Weight of Soil Samples | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mg/L (ppm) | | | | Cmol/Kg | | | | | Percentage | | |
| **Sample ID** | **Landforms** | **Depth (cm)** | **pH** | **Fe** | **Al** | **TON** | **$PO_4$-P** | **Na** | **Ca** | **Mg** | **K** | **CEC** | **%BS** | **% OC** | **%OM** |
| RM-2, | Inland Valley Swamp | 0-20 | 5.74 | 0.04 | 0.23 | 52.8 | 0.76 | 0.146 | 1.96 | 0.815 | 0.168 | 29.28 | 10.05 | 4.72 | 7.87 |
| RM-2, | | 20-80 | 5.33 | 0 | 0.20 | 39.6 | 0.75 | 0.148 | 2.92 | 0.810 | 0.147 | 22.31 | 17.38 | 1.72 | 2.86 |
| RM-2, | | 80-100 | 5.08 | 0.01 | 0.24 | 29.9 | 0.52 | 0.150 | 2.93 | 0.976 | 0.147 | 20.54 | 19.75 | 1.42 | 2.37 |
| RM-3, | Interfluve crest | 0-20 | 4.43 | 0.06 | 0.14 | 37.8 | 0.56 | 0.135 | 3.33 | 0.450 | 0.165 | 17.50 | 22.71 | 2.81 | 4.69 |
| RM-3, | | 20-50 | 4.95 | 0.02 | 0.11 | 35.9 | 0.41 | 0.130 | 3.37 | 0.162 | 0.172 | 20.62 | 17.96 | 1.47 | 2.45 |
| RM-3, | | 50-100 | 4.64 | 0.03 | 0.22 | 33.4 | 0.45 | 0.130 | 4.30 | 0.163 | 0.127 | 11.77 | 39.02 | 1.10 | 1.84 |
| RM-5, | Interfluve sideslope | 0-20 | 5.47 | 0.04 | 0.07 | 35.1 | 0.31 | 0.180 | 4.14 | 0.157 | 0.381 | 30.26 | 15.46 | 7.45 | 12.42 |
| RM-5, | | 20-50 | 5.51 | 0.01 | 0.35 | 30.1 | 0.53 | 0.138 | 3.36 | 0.161 | 0.171 | 24.32 | 15.20 | 3.24 | 5.39 |
| RM-5, | | 50-100 | 5.09 | 0.02 | 0.16 | 27.3 | 0.39 | 0.134 | 2.92 | 0.162 | 0.157 | 18.58 | 17.43 | 1.99 | 3.31 |

Note: pH – Hydrogen concentration ions, OC – Organic Carbon, OM – Organic Matter, TON – Total Nitrogen, % - Percentage, ppm – Parts per million, cms – Centimeters,
CEC – Cation Exchange Capacity, Mg++ - Magnesium, Ca++ - Calcium, Na++ - Sodium, K+ - Potassium, BS – Base Saturation, $H_2O$ – Water, Kg – Kilogram, P – Phosphorous, Al - Aluminium, Fe - Iron, Bray -- (method)

Land Suitability Evaluation

**General**

The land suitability evaluation employed for this study is in accordance with the FAO methods documented in the following publications:

- FAO Framework for land evaluation (1976); and
- FAO "Guideline for land evaluation for rain fed agriculture" (FAO Soils Bulletin No. 52 1983).

The FAO framework is based on six principles. The first principle states that land is evaluated for specific kinds of use. These may be major kinds of lands such as arable farming, livestock production, forestry or recreation or, they may be land utilization types described in some detail. Also, land evaluation can be qualitative or quantitative. The two can be done simultaneously or one after the other. The current land evaluation exercise will be qualitative. That is, the results will be expressed in qualitative terms only, without specific estimates of outputs (crops yield), inputs or costs and returns.

In land evaluation, once the objectives have been clearly defined, two sets of activities are carried out: surveys of the environment which is biophysical surveys leading to land mapping units (or landform/soils units), and the description of possible kinds of land use or land utilization types (e.g. crop, or arable farming).

The requirements of the land use are then compared with the land qualities derived from the surveyed environment by a process called matching. This is accompanied by consideration of environmental impact (in qualitative evaluation) and socio-economic analysis (in the case of quantitative evaluation). The comparison of land with land use leads to land suitability evaluation.

The FAO system has two suitability orders:

- S = Suitable
- N = Not suitable

The suitability order is subdivided into three suitability classes:

- $S_1$ = Highly suitable
- $S_2$ = Moderately suitable

- $S_3$ = Marginally suitable
- Subclasses indicate the limitations such as moisture availability, erosion hazard etc.

- E.g. S2m Moderately suitable due to moisture availability

***Land Quality***

This is a complex attribute of land which acts in a manner distinct from other land qualities and influences the suitability of land for a specified kind of use. The quality is thus an expression of the land use requirements.

***Land Characteristics***

These are attributes of land that can be measured or estimated, and which can be employed as a means of describing land qualities. The land qualities and land characteristics which will be used in the current studies are tabulated below:

**Table 5.14: Land Qualities and Land Characteristics**

| No | Land Qualities | Land Characteristics |
|---|---|---|
| 1 | Rooting space(r) | Soil texture (t) |
| 2 | Soil fertility (f) | Soil nutrient status (n) Soil reaction (a) |
| 3. | Availability of moisture (m) | Water requirement<br>Growing period<br>Temperature<br>Drought resistance<br>Humidity |
| 4 | Availability of oxygen (o) | Drainage (w)<br>Flooding (fl)<br>Permeability (p) |
| 5. | Resistance to erosion (e) | Slope steepness (s)<br>Surface stones and rocks |

*Source: After Birchall et al (1979)*

***Matching Process***

Having recorded the qualities of the soil units (land qualities) and having described the land use requirements and the utilization type, the matching process was then implemented. This involved comparing the requirements of the land use with the land qualities of the soils units to arrive at a suitability classification of each of the soil units for the crop.

**Land Suitability Evaluation of the Study Area**

The Land suitability evaluation of the study area has been subdivided into three units, which are soil management units. This is defined as areas, which, for practical management purpose, can be treated as the same based on the slope and textural differences.

Each unit is described in terms of landform and the constituent soil types. From the agricultural view point the study area has the potential which can be enhanced if proper management principles are followed.

The final evaluation results showing the suitability order (e.g. S), the class (e.g. S2) and the subclass (e.g. S2f) for the four landform/soil units are shown in the current land suitability evaluation. For example the table shows that suitability for the Interfluve (sideslope) for the cultivation of cassava currently is S2fr. This means that the Interfluve (sideslope) have moderate suitability for cassava, with the limitations of soil fertility (f), low Cation Exchange Capacity (CEC) values and high acidity and also rooting depth (r) because of compacted gravels which hinders root development. Details of elements that determine the final land suitability for each crop cultivated within and around the study area are given in the current land suitability evaluation table below.

Three landform/soil units were evaluated for nine selected crops that are commonly cultivated in the study area. From the suitability evaluation the uplands are generally moderate to marginally suitable as low fertility and shallow soil depth are the main limiting factors while the bottomland has a moderate to low soil fertility as a limiting factor.

Vegetation and Fauna

***Overview of Vegetation and Fauna in the Port Loko District***

Port Loko District is mainly covered with remnants of the moist evergreen forest. These are most extensively forest/bush regrowth, secondary forests and savanna woodland.

The forest/bush regrowth is a fallow mainly derived from the arable system of cultivation but also from logging and charcoal production activities. This means that the vegetation type cannot be divorced from its derivative landuse activities. Bush regrowth is a fallow vegetation type mainly evident as thickets at different stages of growth. Their growth stages range from just a year's fallow

comprising of the most recent crop remnants and shrubs, to mature thicket vegetation of up to mostly about eight years.

Secondary forests within the district mainly occur in patches. They are generally found boardering the forest regrowth vegetation or around settlements where they are also inclusive of fruit trees. A marked characteristic of this forest within the district is its occurrence with the tree crops of oil palm and citrus: This forest accounts for the secondary vegetation evident for a good distance coverage around settlements.

The moist evergreen forest comprising primary and mature secondary forest, here referred to as the closed high forest, are virtually lost through man's variable land use activities.

Vegetation in the low lying areas such as inland valley swamps and flood plains comprise either fallow vegetation of hydromorphic grass types or trees such as mitragyna stipulosa and raphia vinifera which are characteristic of the inland valley swamps

Fauna within the district generally comprise various species of mammals, reptiles, birds, crustaceans and fishes. These include, monkeys, deer, porcupines, antelope, boas and cobras, hawks, weaver birds and secretary birds, shrimps and crabs and tilapia, eels, catfish and cutlass fish to name a few.

*Vegetation (Flora)*

***Methodology***

The baseline survey was carried out within few selected locations within the three sections of the BKM chiefdoms. This selection was made to enable a general coverage of the area because of the short duration assigned to the field survey and the size of the area to be covered.

The vegetation survey was carried out by use of a GPS, the topographic map covering the area, the national vegetation and landuse reconnaissance map, motorable tracks and footpaths to penetrate the area as far as is possible to observe the vegetation cover present. Local guides were also used to help access the area and to identify some of the vegetation types.

***The Vegetation Cover***

The Current vegetation cover of the project area comprises secondary forest, Savanna woodland, gallery forest, bush regrowth, upland grass and swamp vegetation.

***Secondary Forest***

The secondary forests are generally found around settlements, though sometimes occurring as minor inclusions within the bush regrowth vegetation because it was not completely removed at the time of clearing. This regrowth type can also sometimes occur at adjacent locations to gallery forests.

This vegetation type generally represents a degraded form of the once existing rain forest vegetation that had previously been removed following the slash and burn method of cultivation that prevails in the country or depleted by logging or cleared for mining purposes. Generally within the country, this is a dense type of vegetation with tall trees of up to 30m in height. Within the surveyed area, this forest often occurs with fruit trees around settlements and plantation. They therefore often have dense under growth formed by the underlying crops. They depict two layers of canopies – a closed lower canopy formed by the underlying plantation and a moderately closed higher canopy formed by the taller forest trees shading the plantation. These secondary forests also comprise fruit trees such as mango (Magnifera Indica), orange (Citrus Sinensis), breadfruit (Artocarpus communis var), plantain (Musa paradisiacal), banana (Musa sapientum), avocado (Persea Americana), guava (Psidium guajava), cashew (Anacardium occidentale), lime (Citrus aurantifolia), coconut (Cocus nucifera), pawpaw (Carica papaya) kola nut (Cola nitida), grapefruit and almond. Scattered oil palm trees are also evident and so are the cotton tree, the bamboo and castor oil plant and an infrequent occurrence of the exotic Yemani (Melinda arborea) and eucalypt tree species. These exotic species have been cultivated and are evident either as boundary demarcation or are cultivated randomly to afforest certain areas that have been deforested. Away from the settlements, the secondary forest generally comprises of forest trees including the cotton tree (Ceiba pentandra), the umbrella leaf tree (Musanga cecropioides and brimstone (Morinda geminata). The shrub referred to as krismes tik (Alchornea cordiforlia), is also evident. Undergrowth of shrubs, lianas and the sword/razor grass (Scleria barteri) which do not however hinder penetration of this forest are also present.

***Savanna Woodland***

The savanna woodland vegetation generally occurs on very compacted gravel or hardpan soils. This vegetation is characterized by a grassland vegetation with lophira tree species in between and patches of bush regrowth in areas were the soils can accommodate regrowth vegetation.

***Gallery Forest***

The gallery forest vegetation type is generally found along water ways. Within the newly cultivated area, it is evident along the banks of the Scarcies River and especially along large streams. Due to its location, it assumes an elongated form, occurring usually as a narrow strip of secondary forest though the width could vary from place to place along the stream bank. It is dense forest vegetation comprising tall forest trees similar in height to those of the secondary forest. This forest is broken in places due to intermittent clearing for landing of canoes at ferry points or for sand mining. The trees are mostly

moisture accommodating especially those at the edge of the river bank and have variable sizes of girth. The gallery forest usually consists of a dense canopy and some of the trees, especially those highly influenced by waterlogged conditions mostly have buttress or stilt roots. Some of the species found in this forest include Pentaclehtra macrophylla (an oil bean), Uapaca guineensis (a tall savanna tree species) and Pterocarpus Santalinoides.

***Bush Regrowth***

The bush regrowth is a fallow vegetation of thicket derived from the shifting cultivation system of farming and may occur adjacent to the secondary forest vegetation within the area of survey.

The bush regrowth within the nucleus project area generally comprises thicket vegetation in several stages of fallow ranging from a one year farm bush to about six to seven years of regrowth. The recent farm bush mainly comprises remnants of last year's crop while others of up to three years consisting of low herbaceous shrubs sprouting from tree stumps in addition to the crop remnants. Older regrowth vegetation comprises taller trees with heights ranging between 3 meters to about 10 meters; though taller and larger trees pertaining to the secondary forest and naturally growing oil palm trees, also have a scattered occurrence within this vegetation type in places. Girths are variable in sizes but are generally narrow. This vegetation community generally consists of an impenetrable undergrowth of shrubs, herbs and the sword grass (Scleria barteri) all of which renders the regrowth vegetation much more difficult to penetrate than the secondary forest. Tree species and their identifiable names include Musanga cecropioides (umbrella leaf tree), Morinda geminata (brimstone), Eleais guineensis (oil palm tree), Ceiba pentandra (the cotton tree), Parkia biglobosa (African locust bean), Terminalia Ivorensis (ronko tree), Harungana Madagascariensis (blood tree) and Nauclea Latifolia (igbesi) and Anthrocleista spp. Fruit trees such as Arisophillea laurina (monkey apple – a very sour plum) and Dialum guineense (tamarind) are also evident. The shrub Alchornea cordifolia (known as krismes tik) is evident generally at the edge of the regrowth

where light is much more available, while the sensitive plant, Mimosa Pudica is also sometimes present as a ground cover vegetation, helping to hinder penetration since it is a thorny plant.

***Upland Grass***

The upland grass has minimal coverage in the area surveyed and is mainly evident adjacent to some roads and footpaths where they generally form a linear feature running for some distance with the path. This vegetation mainly comprises the species referred to as cane grass, (Chasmopodium caudatum).

***Swamp Vegetation***

Swamp vegetation refers to the hydromorphic fallow vegetation found in inland valley swamps (IVS). The IVS's with this aquatic vegetation cover, are those that have been cleared of their virgin vegetation, utilized for cultivation and left to fallow so that their vegetation can be regenerated.

This swamp vegetation mainly comprises low dense wet grass types, shrubs of regenerating tree species and scattered tall trees, all characteristic of the IVS ecology. These generally form a very open vegetation comprising species such as Raphia vinifera (Raphia palm), Mitragyna stipulosa (known as agidi leaf), Coix lachryma jobi (sword grass found in IVS) and Thaumatococcus Danielli (an herbaceous rhizome bearing purple flowers) all of which are characteristic of the inland valley swamp; where its cultivation can only take place.

Fauna

***Methodology***

Identification of the animals was done through field observations, the administration of a checklist formulated for the field work and information obtained from the field guides who are also indigenes of the project area.

***The Fauna***

The types of fauna present in the project area are generally the same from one location to the other. Fifteen animal species were identified and they include mammals, reptiles and birds. These fauna

species have all been reported to be in existence in the area by the indigenes of the project area while some have also been observed in the field during the survey.
The animal types present within the project area include herbivores such as deer and antelopes, rodents such as squirrels, hares, rats, grass cutters and porcupines, snakes including boa constrictors, cobras and grass snakes, primates such as monkeys (Diana species – whose protection status is vulnerable) and other mammals including wild pig, buffalo and muskrat.

Bird species evident include weaver birds always found nesting on palm trees, wild pigeons which though living in the wild, make frequent appearances in the settlements, wild chickens which when not encountered in the grass or regrowth vegetation which constitutes their habitat could be observed on roads or footpaths, sparrows, hawks and secretary birds which belong to the eagle species. It is reported that the latter two bird types often prey on domestic chickens.

Habitats conducive for the animals to thrive are found extensively in the area, due to the existence of the generally dense and extensive vegetation cover. The secondary forests and Bush regrowth ecologies form the environment conducive for these animals to thrive though they could also be present in the minor coverage of the grass vegetation. It is therefore an area that generally favours the thriving of animals which are sometimes hunted and when caught, form part of the main diet of the household concerned.

The overall aquatic habitats in the surveyed project area are all fresh water bodies. These comprise the Scarcies River and its network of tributaries such as the Magbison, Kondion, Kape, Pampanko. Six fresh water fish species and two crustaceans have been identified comprising tilapia (Tilapia zilli), snappers, catfish (Chrysichthys sp), eel (Anguilla sp) and a flat elongated species referred to as cutlass fish (Noteptunis sp). The crustaceans identified are crabs (Clliectus sp) and shrimps (Nematoplaemon Tenuipes).

Generally, the project area was found to hold no globally, regionally or locally threatened fish or other animal species. Also, endemic species were not recorded. All the species recorded in the survey can be found in other fresh water and land ecologies in Sierra Leone.

Land use

***Overview of the Landuse in the Port Loko District***

In Port Loko District the main land use activities are agriculture and fishing. Agriculturally, Port Loko is estimated to be one of the most vulnerable districts in the country, producing Less than 20% of the country's cereal requirements. The main food crops cultivated are rice, cassava and vegetables. These arable crops are grown following the bush fallow system. Under this system, a patch of forest is cleared and burnt, and the land cultivated usually for a short period of time (1 – 2 years), after which it is left to fallow for several years. With increasing population pressure on the land, fallow periods tend to have become progressively shorter so that this system has now reached the stage where the soil fertility cannot be restored naturally under the normal traditional farming system. This has created a reduction in the yields of these arable crops.

### *Methodology*

A checklist was formulated to capture the various land use categories from as much of the community members of the settlements as possible. The checklist was administered in all the selected settlements to collect information on agriculture, livestock, fuel wood, fishing, mining, hunting/fauna, tourism, forestry, anthropology, recreation, leisure, art and craft. The information obtained was analyzed to obtain the general land use practices of the indigenes and residents of the project area.

**The Land uses**

### *Agriculture*

Agriculture is a very common occupation within the project area, practiced in all of the surveyed settlements. As was revealed by the farmers, areas cultivated range from about 1 acre to 100 acres in size, depending on the type of crops cultivated.

The annual crops constitute relatively small farms in both the uplands and the low-lying areas, ranging from about a quarter of an acre to about 5 acres. The smallest of these farms are found in the low areas of the inland valley swamps (IVS) and minor flood plains and are generally not larger than 2 acres and mostly only about 1 acre in size.

The permanent crops which form the plantations range mostly from 4 acres to 100 acres though smaller sizes are also evident. The largest of these plantations are those of the oil palm of which the community oil palm plantation which was formerly established by the Government and operated by Sierra Leone Produce Marketing Board (SLPMB) accounts for the largest continuous coverage. The citrus and other fruit trees plantations range from 1 acre to about 5 acres in size.

Annual crops cultivated on the uplands within the project area include rice, cassava, sweet potatoes, groundnut, cocoyam, yam, maize the beans variety referred to as Congo beans (Cajanus Cajan), beeniseed, couscous and pumpkin . Vegetables are cultivated on the uplands during the rains and include pepper, garden eggs, onions, okra, cucumbers, tomatoes and other vegetable leaves for cooking such as krain krain and the African spinach referred to as (grins). Mostly, a mixed system of farming is practiced wherein upland rice is cultivated with maize or maize could be cultivated with vegetables such as okra, sorrel and pepper to name a few of the mixed crops.

Since the survey has been carried out during the rainy season, the only crop cultivated within the low-lying area of the inland valley swamps, comprises paddy rice. Cultivation in this landform is usually done in small patches even though it forms one of the most productive ecologies in the country. Though the farmers cultivate these swamps, they generally prefer to cultivate on the uplands because as is often revealed by them, cultivating the swamps is tedious and could be hazardous to health especially in the rainy season when these inland valley swamps are flooded.

Sweet potatoes, cassava, maize and vegetables are cultivated within the inland valley swamps during the dry season because the water regime permits them to thrive well during that period when the water table is low. The crops are cultivated on heaps within this ecology during the dries, as this enables them to get adequate water supply that will not be in excess of their requirements due to the height of the water table. Vegetables such as pepper, garden eggs, onions, okra, leaves for cooking sauces such as (krainkre) – (Corchorus olitorius) and the African spinach (Amaranthus hybridus var cruentus) (locally referred to as grins), are also cultivated in the inland valley swamps during the dry season period .

The major permanent crops comprise oil palm, (Eleais guineensis), citruses and other fruit trees. The citruses and other fruit trees are mixed with the secondary forests around the settlements and could sometimes extend for considerable distances away from the settlements covering an area of up to about 10 acres and even more as was indicated by the interviewees. These plantation types are sometimes found as mixed crops in the same plantation and sometimes occur as single crops. Kola nuts are also present within these plantations though usually quite sparingly. Oil palm is a prominent economic crop of the area. There is both the estate (former SLPMB plantation) and also numerous privately owned oil palm plantations. The estate plantation covers a continuous stretch of 4,480 acres of land (i.e. 7 sq miles).

The private holdings unlike the estate have a scattered occurrence and are sometimes only visible through forest penetration. As with the estate plantation, some of these small holdings are also neglected agronomically and are sometimes infested with parasitic plants. l

The annual crops of the uplands are cultivated by the shifting cultivation pattern of slash and burn, using traditional tools such as hoes, shovels and cutlasses. There is no practice of improved traditional system of cultivation evidenced in the area. The application of chemical fertilizers is generally practices at a low level in the project area as has been made explicit by the farmers, due to its unaffordable cost.

Fallow periods mostly range from 3 years to 7 years as has been revealed by the indigenes of the various settlements and coverage of very young to mature forest regrowth vegetation within the area generally. If cassava is planned to be cultivated on a harvested field, then the fallow period is shortened mostly to 2 years. The inland valley swamps are usually cultivated every year either once a year in the rainy season or right through the year with different crop types differentiated by the seasons.

Vegetables and crops such as maize and groundnut are cultivated as perennial crops, because they are being planted on the uplands during the rainy season and in the inland valley swamps during the dries.

Generally, the arable crops are cultivated mainly for subsistence purposes and yields are generally very low since mainly small areas are cultivated and in addition, fertilizer application is not practiced giving increased yields. The crops could however be commercialized depending on the crop type. Cassava, maize, groundnut and sweet potatoes are generally sold to generate income, while rice is commercialized depending on the financial necessity of the farmer now in time. However, rice and vegetables are mainly for home consumption. The permanent crops often referred to as economic crops, are always commercialized albeit on a small scale, to help generate income for the welfare of the home. These generate much more income than the arable crops though yields, as declared by the farmers are low to moderate but figures cannot be obtained.

***Livestock***

Poultry (chicken and ducks), sheep and goats are the livestocks reared within the project area. These livestocks are mostly reared by free range feeding, being let loose in the morning and confined late in the evening. The bovines, especially the goats, are however sometimes confined to prevent them from destroying crops in the farm fields. When confined, they are either tethered in compounds and the food brought to them or they are otherwise tethered in grassy areas where they could feed. In some areas where they can feed free range, the farms are fenced to prevent them any entrance. The poultry is not confined though they are generally fed in the morning before

being allowed to feed free range. They are also fed in the evening before being locked up for the night. The bovines are fed mostly with cassava leaves, cassava crop or grass as was declared by respondents, while the poultry are fed with rice or bulgur when available. The livestocks are reared in small numbers either by an individual or a family of a household. As was stated in some villages, some of the goats and sheep have only been left under the custody of variable individuals in the community by relatives or close friends from other villages and do not necessarily belong to indigenes of the settlement.

The livestocks especially the bovines, are reared mainly for subsistence purposes to generate income for dire necessities such as medication and education. The poultry can also be commercialized to offset financial constraints but can also occasionally be used for home consumption, during societal celebrations or for preparing meals for visitors and strangers.

***Fishing***

This activity is mainly carried out in the Little Scarcies River, in streams at proximity to the different settlements such as the Malapan, Kondion and Magbuson. Fishing is a common activity in all the settlements within the surveyed project area and it is generally done by all sexes and by adults as well as children. The women and girls usually fish with small elliptically shaped nets (commonly referred to as baimbay), hand-woven by the women, while men and boys prefer using hooks and lines, fish traps and sometimes large nets. The women and children mainly concentrate their fishing activity in the streams and fish in the Scarcies River only during the dry season when the water volume is low. The men generally fish in the Scarcies and in the streams. The fish traps are also good for rainy season fishing.

Quite often, only small fishes are caught, and these include catfish (Chrysichthys sp), mango page (tilapia zilli), cutlass fish (Noteptunis sp) and snappers, while other species comprise eel (Anguilla species), crab (Cllinectus sp), brown shrimps (Nematoplaemon tenuipes. Fishes caught by the women are always for home consumption, though excesses can be sold to help generate some income. Those caught by men and boys, are often sold, though also taken home for consumption.

***Hunting***

Hunting is evident but is limited to the use of traps and dogs rather than guns whose use is prohibited. The vegetation cover of secondary forests and Bush regrowth within the surveyed project area provide quite extensive habitat for the animals. Traps are also laid for the animals in the farms. The farms are fenced, and a couple of openings left in the fence, at which point traps are laid. An animal attempting to penetrate the farm through any of these openings is likely to get

caught in the trap. Animals caught include deer, grasscutters, antelopes, wild pigs, squirrels, hares, porcupines, large rats, musk rats, and wild chicken. Boa constrictors are sometimes killed and eaten when accidentally caught in traps but are generally not hunted. Cobras and other snake types are also evident in the area but never hunted because they are vipers. The traps are laid mainly by men but also by boys at distances of between ½ mile (about 0.8 kms) and 3miles (about 4.8 kms) from the settlements. Any catch made, is either for home consumption or could be sold to generate some income especially when a large animal such as a deer is trapped.

Groups are formed in some of these settlements for hunting. The catch is normally sold if it large and shared among themselves if the catch is small.

***Tourism***

The project area as observed by indigenes of the area, lacks tourist attraction except, as suggested by some of inhabitants, the rapids in the Scarcies River, the village were Bai Bureh was born and the graves of colonial whites fighting the hut tax war.

***Forestry***

The protected forests evident within the project area are those within the settlements that are protected by local traditional laws because they are used for secret societal activities. Such forests should not be brushed and in this project area, these forests are usually those of the male secret society which must not be accessed by the opposite sex (female society bushes are also protected).

There are no forest reserves within the project area surveyed but some exotic forest trees are present in some of the settlements. Some Environmental NGO's supplied seedlings of exotic tree species to the community. These were planted in various places in the settlement and are evident for example some school compound as line of trees along the boundary and within the compounds.

***Fuel wood***

Firewood is the energy used for cooking by the communities within the project area, vegetation is available for fuelwood harvesting and this is mostly concentrated on the mature bush regrowth vegetation and the secondary forests away from the settlements. In general, these vegetations are not just specifically felled for fuel-wood collection but mostly for cultivation following the slash and burn system. Preparing the land for cultivation incorporates the clearing of the felled and burnt trees which are the fuel wood. Wood harvesting is also affected however when those on the land cleared for cultivation have been exhausted.

The trees are mainly felled by men and older boys especially in farm clearing, but women, boys and girls are also involved in chopping the felled trees into smaller sizes. Distances ranging

between ½ a mile (about 0.8 kms) to about 4 miles (about 5.4 kms) are claimed to be generally covered on foot to obtain the wood. After harvesting, the firewood is brought back home in variable sizes of bundles by head carrying. Fallen dried up trees within the forest around the settlements and palm fronds are also collected for fire-wood.

Firewood is procured mainly for home consumption but can sometimes be commercialized especially by the male harvesters (men and boys). It is not a lucrative business in the settlements considering that most households do their own woodcutting. However, wood sellers from some of the villages have revealed that they sell fire wood at the larger settlements of Port Loko and Mange.

Charcoal is widely produced in the study area but is used by very few people. It is mostly producing for commercial purpose as buyer comes from Port Loko, Mange and even Freetown. The production is widely spread in the areas of the Savanna woodland vegetation were the Lophira tree (commonly called iron charcoal) occurs.

***Anthropology***

Secret society bushes and shrines are evident in some of the settlements investigated in the survey area. The generally dense secondary forest vegetation cover of the project area provides a favorable environment for both male and female secret society activities and these are especially of the Bondo, Poro and Ojeh traditional societies which are the most common in the area.

***Logging***

Logging and bush pole collections are carried out minimally within the surveyed project area. Some of this logging is done for commercial purposes and for local carpenters to access boards used in their carpentry while the bush poles form one of the major materials necessary for the building of the usual mud houses common in the area.

***Recreation and Leisure Activities***

Recreational facilities in most of the settlements as is generally observed in the provinces, mainly comprise football and athletics. Football is usually played on bare ground mostly in school premises but also elsewhere in the settlement. Athletics as has been observed is only evident in communities with schooling facilities. Every surveyed environment without schooling facilities comprises communities that lack recreational activities. From this conclusion recreational activities are absent in almost all the settlements.

Leisure activities comprise drinking of palm wine, hard liquor in small sachets (called Tot-a Pak) and soft drinks, occasional dancing to pop music from musical sets hired from Barmoi, Port Loko and Kambia, traditional dances involving the secret societies, listening to news and music

from FM radio stations and playing of audio musical cassettes. Traditional dancing is most common with the female secret society (the Bonda society) and in some villages, this dancing can go on for as long as a month during the dry season, as was revealed by members of the community. Mange which is the largest settlement within the project area was observed to organize dances not occasionally, but as often as every week in the court house (court Barrie). Watching television shows is another form other leisure activity within the 116

Mange community. The television show is a commercialized activity in which people can watch live international football matches and films from video cassettes.

***Art and Craft***

Artists are only evident in Mange within the surveyed project area and these are either singers/musicians. Craftspersons are evident in the form of carpenters, masons, tailors, weavers of fishing nets (baimbay), country clothes, winnowers, baskets, hammocks and mats. These crafts work also comprises gara dying and soap making, wood carving of mortars, pestles, ladles and walking sticks.

Hydrology

***General***

Sierra Leone can be divided into twelve river basins and the most important of these from west to east, are: the Kolente (Great Scarcies), Kaba (Little Scarcies), Rokel, Pampana (Jong), Sewa, Moa, and Mano. Other streams rise in the lowlands, and the most important of these are the Ribi, Kukuli, Gbangbaia and Waanje Rivers. The river basins are relatively small but, because of the heavy rainfall, the discharges are rather high, varying between 20 and 40 percent of the annual rainfall total. Below is a drainage map of the country indicating the main river systems.

Port Loko District is drained by the Little Scarcies River. It flows throughout the dry season and floods over its bank during the rains. The drainage system of the district has developed from the numerous valley swamps which are the headwaters of the Little Scarcies River, major streams and their tributaries.

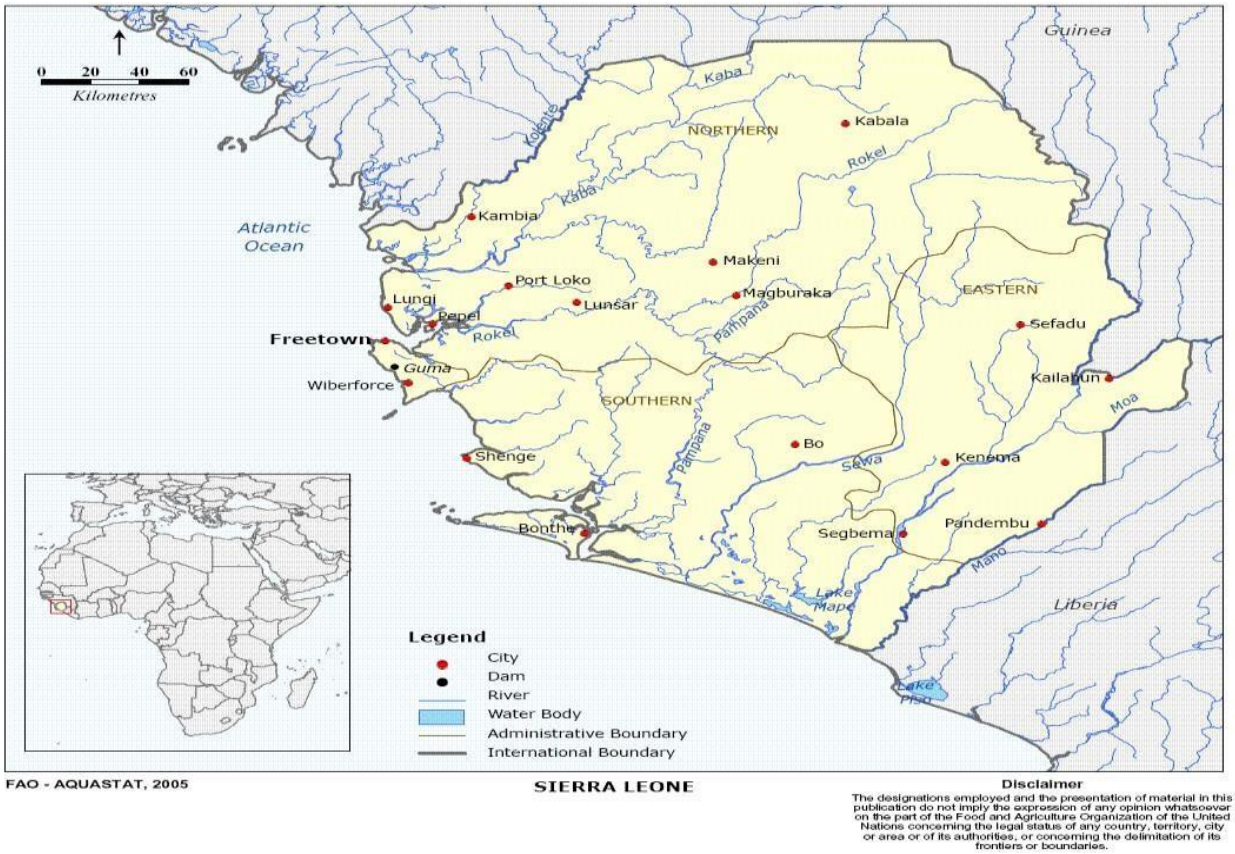



Figure 5.1: Drainage Profile of Sierra Leone

***Hydrology of the Project Area***

The Little Scarcies River forms a major part of the hydrological system of the study area. It stretches about 160 km from the north-western part of the country (Guinea border), right through Port Loko District southern-wards into the Atlantic Ocean. Its basin is relatively small but with disproportionately high flow/discharge values due to the generally heavy rainfall within that region of the country. The minimum discharge is 5.1m3/sec relating to peak dry season period and the maximum discharge is 1801m3/sec relating to peak rainy season period. The Little Scarcies River covers a total drainage area of 12,870km2 with an annual run-off of about 1787mm. The area is dissected by streams mostly draining the inland valley swamps, which are very characteristic of the landscape of the country. They give an indication of the presence of groundwater in the area. These streams are all tributaries within the Little Scarcies River basin into which they drain. Most of Port Loko District has an average annual precipitation of over 2500mm.

***Hydrogeology***

From other field investigations and literature review, basic information was derived on the hydrogeology which has been used to make the following conclusions. The area falls within the extensive granitic complex of the country and generally comprises a hydro geological structure

that can be divided into two main aquifer types. These are the upper weathered aquifer and the underlying fractured aquifer.

The study area is underlain by both the weathered and fractured aquifers which can be subdivided into the various geological units; that are granite and acid gneiss from which they are derived.

The depths of the water table in most of the underground sources are indicative of the weathered aquifer water levels. During the period of the survey water tables were generally high considering that it was the rainy season. Swamps were flooded by their draining streams and were therefore waterlogged. Wells, though observed to have variable heights of water table, all have high water tables ranging between 8 meters to about 11 meters. The highest water tables were observed in wells at proximity to streams/inland valley swamps.

Several springs are evident within the project area. The formation of springs is governed by the geology (vis-a-vis the lithological status and layering of the rock) and is generally associated with a pinching out of the weathered aquifer by an impermeable layer, e.g. the underlying bedrock. The springs in the study areas are used for drinking and other domestic uses.

*Water Quality*

Sierra Leone is situated at the northern limit of the equatorial rainforest zone, with a hot and humid tropical climate. The country is well watered and is one of the most humid countries of Africa with a mean annual rainfall of 2,526 millimeters per year (mm/yr), ranging from 1,900 to more than 4,000 mm/yr. There are two distinct seasons: the pronounced dry season lasts from December to March and receives 6 to 7 percent of the annual total rainfall, coinciding with solar radiation of between 25.9 and 60.9 kilocalories per cubic centimeter (kcal/cm2) and low humidity. Relative humidity is between 95 and 100 percent in the rainy season but it can drop down to 20 percent in the harmattan season. Evaporation is between 1,200 and 1,900 mm/yr. The mean daily temperature varies between 25°C and 28°C.

Internal renewable water resources are estimated at 160 cubic kilometers (km3/year), with surface water accounting for 150km3/year. Seasonal variations are important: only 11-17 percent of the annual discharge occurs between December and April, with minimum discharge in April. Internally produced groundwater is estimated to be 50km3/year. Of that, 40km3/year is overlap between surface water and groundwater.

The study area falls within the catchment zone of the Little Scarcies River.

***Water Quality Assessment***

Studies of water quality are largely concerned with the storage of water in various environmental systems and the flow of water within and between these systems. The main catchment within the study area is the Little Scarcies River.

***Methodology***

A reconnaissance water survey was carried out within the area to identify water sources. Water samples were collected in 1.5 litre plastic bottles in the project survey area from the following settlements:

- Kalangba;
- Masimbo;
- Rosint;
- Masisi;
- Mange Morie;
- Mabain;
- Little Scarcies; and
- Konta Ferry.

Water quality measurements are compared against scientifically derived criteria, known as guidelines. If the measurement is within the guideline value, it is deemed to be acceptable. The World Health Organization water quality standards have been used as the basis for qualifying the analytical results of the water samples.

***Surface Water Quality***

The sample area is within the Little Scarcies River basin. The Little Scarcies River flows from the north-western part of Sierra Leone southern-wards into the Atlantic Ocean. An Environmental/Ambient Water Quality Assessment was carried out. Ambient water quality pertains to water bodies such as lakes, rivers, and oceans. Within the area, the streams and the river were mainly assessed visually and using a checklist to find out their quality status through their uses.

During the investigations, sample sites were located, and sample location(s) recorded using a GPS. Fifty-two (52) sample locations in thirty (32) villages were investigated. Two samples were collected from surface water points, one from a stream and the other from the Little Scarcies River. Six ground water samples, two from wells and four from springs were also collected, totaling eight laboratory samples analyzed (refer to table 3.16 below).

Ambient water quality standards vary significantly due to different environmental conditions and the variable human uses. Toxic substances and high populations of certain microorganisms can present a health hazard for non-drinking purposes such as irrigation, swimming, rafting, boating and industrial uses.

***Turbidity***

Visual observations of the samples show the water in the Little Scarcies River to be muddy brown and the water in the stream at Mabain to be colourless. This corresponds with a turbidity value of 9.1 from the analysis for the Little Scarcies River, which is far above the Maximum Contamination Level (MCL) and 1.7 from the stream at Mabing which is below the MCL (maximum contamination level being <5 NTU according to WHO standards). Turbidity is caused by suspended particles such as clay, silt, organic and inorganic matter and other micro-organisms.

***pH***

The pH readings for the two surface water bodies analyzed are 5.1 and 5.2 for the Mabain stream and Little Scarcies River respectively. These readings fall within the level for safe drinking water (5.0 – 8.5) (WHO guidelines).

The pH of natural water varies and can change dramatically both seasonally and through the day. Many freshwater systems have naturally low pH and should not be regarded as having poor water quality. Low pH affects many freshwater animals directly, but a major effect is that they increase the solubility of toxic pollutants such as Aluminum. Freshwater ecology and fisheries can be seriously affected. Increased acid levels in fresh water can also affect the micro-organisms responsible for the breakdown of organic material such as leaves. This may lead to a reduction of the aquatic invertebrates and plankton that utilize broken down organic material.

***Total Dissolved Solids (TDS) and Electrical Conductivity (EC)***

Dissolved solids refer to any minerals, salts, metals, cations or anions dissolved in water. Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulphates) and some small amounts of organic matter that are dissolved in water. In general, the total dissolved solids concentration is the sum of the cations (positively charged) and anions (negatively charged) in the water. An elevated total dissolved solids (TDS) concentration is not a health hazard. The TDS concentration is a secondary drinking water standard and therefore is regulated because it is more of an aesthetic rather than a health hazard. The TDS values for the samples range from 7.4 to 25.8 ppm, which is far below the maximum limit permissible for safe drinking water of 1000 ppm (WHO Water quality standards).

Electrical Conductivity (EC) is a measurement of the ability of an aqueous solution to carry an electrical current. The results show EC measurements ranging from 14.7 to 25.8 μs/cm. The results also show these figures to be higher than the maximum standard value for drinking water, which is 0.05 μs/cm (WHO water quality standards).

***Anions***

***Chloride***

The result for chloride anions in the sample ranges from 14.2 to 17.8 mg/l. The samples collected have chloride levels far below the permissible standard value for drinking water (ranges between 0 - 250 mg/L as recommended by WHO). Chloride is a chemical the human body needs for metabolism and it also helps keep the body's acid – base balance. Chloride concentration above 250 mg/l can produce a distinct taste in drinking water. A noticeable increase in chloride concentrations may indicate pollution from sewage sources.

***Nitrate***

Nitrate is one of the most common groundwater contaminants in rural areas. It is regulated in drinking water primarily because excess levels can cause methemoglobinemia, or "blue baby" disease. Although nitrate levels that affect infants do not pose a direct threat to older children and adults, they do indicate the possible presence of other more serious residential or agricultural contaminants, such as bacteria or pesticides. A standard value near 10mg/l for nitrate has been used in this study (WHO Water Quality Standard), and the samples have nitrate levels below this limit (ranges between 5.7– 7.36 mg/l).

***Cations***

Cations constitute the particles with positive charge(s). These include iron, manganese, sodium, potassium, aluminum and hydrogen ions.

***Iron***

Iron in drinking water can be objectionable because it can give a rusty colour to laundered clothes and may affect taste. Iron is frequently found in water due to large deposits in the earth's surface. Iron is not hazardous to health, but it is considered a secondary or aesthetic contaminant. Essential for good health, iron helps transport oxygen in the blood. The maximum standard value for iron in drinking water is 1.0 mg/l (WHO Guidelines), however; concentrations as low as 0.3 mg/l can cause water to turn a reddish brown colour. The surface water samples all contain levels of iron (0.06-0.09 mg/l) below the standard value, which explains the slightly brownish colour of the samples.

***Aluminum***

The maximum contamination limit for aluminium is 0.20 mg/l. The laboratory results show that the samples have levels lower than the permissible limit for human consumption ranging from 0

to 0.01 mg/l. Waters containing high concentrations of aluminium can become toxic to aquatic life since high aluminium concentrations has the tendency to result in low pH values.

***Calcium and Magnesium***

As water moves through soil and rock, it dissolves very small amounts of minerals and holds them in solution. Calcium and magnesium dissolved in water are the two most common minerals that make water "hard." The degree of hardness becomes greater as the cationic (calcium, sodium, potassium and magnesium) content increases and is related to the concentration of multivalent cations dissolved in the water. Hard water is not a health hazard and, in some instances, where dissolved calcium and magnesium are very high, water could be a major contributor of calcium and magnesium to the diet. Hard water interferes with almost every cleaning task from laundering and dishwashing to bathing and personal grooming. The amount of hardness minerals in water affects the amount of soap and detergent necessary for cleaning. There is no primary or secondary standard for water hardness.

The taste threshold for the calcium ion is the range 100 – 300 mg/litre, depending on the associated anion, but higher concentrations are acceptable to consumers. Hardness levels above 500 mg/l are generally considered to be aesthetically unacceptable, although this level is tolerated in some communities. There were no calcium ions present in the surface water

**Table 5.16: Water Physico-Chemical Analysis**

| Location | Water Source | pH | Turbidity | TDS | EC | Fe | Al | Ca | Mg | $NO_3$-N | $NH_3$-N | $PO_3$-P | Faecal Coliform | Non-faecal coliform |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Kalangba** | Spring | 5.9 | 0.7 | 21.6 | 42.8 | 0.09 | 0.03 | 21.3 | 1 | 15.3 | 0.17 | 0.10 | Nil | 10 |
| **Masimbo** | Well | 5.7 | 0.6 | 10.5 | 20.9 | 0.02 | 0.06 | 14.2 | 0 | 15.9 | 0.19 | 0.10 | 2 | 5 |
| **Rosent** | Spring | 5.5 | 1.1 | 14.8 | 29.5 | 0.02 | 0.03 | 14.2 | 1 | 8 | 0.20 | 0.17 | Nil | Nil |
| **Masisi** | Well | 5.2 | 0.4 | 73.4 | 145.4 | 0.01 | 0.04 | 21.3 | 2 | 15.3 | 0.19 | 0.16 | 5 | 10 |
| **Mange Mori** | Spring | 5.8 | 0.4 | 11.1 | 22.1 | 0 | 0.02 | 21.3 | 1 | 7.06 | 0.22 | 0.11 | Nil | 15 |
| **Mabain** | Stream | 5.1 | 1.7 | 7.4 | 14.7 | 0.06 | 0.01 | 14.2 | 1 | 5.7 | 0.21 | 0.22 | 5 | 10 |
| **Little Scarcies** | River | 5.2 | 9.1 | 13.3 | 25.8 | 0.09 | 0 | 17.8 | 5 | 7.36 | 0.22 | 0.27 | 2 | Nil |
| **Konta Ferry** | Spring | 5.7 | 1.6 | 8.9 | 17.6 | 0.02 | 0.03 | 21.3 | 2 | 4.62 | 0.18 | 0.04 | 5 | 5 |

**World Health organization (WHO) Standard Limits for Water Quality**

**pH:** 5.5 – 8.5
**Iron:** 0.3 mg/l
**Manganese:** 0.05 mg/l
**Aluminium:** 0.20 mg/l
**Nitrate – Nitrogen:** 10 mg/l
**Electrical Conductivity:** 450 µs/cm
**Phosphate:** 0.03 mg/l
**TNTC:** Too numerous to count
**Turbidity:** 5NTU
**Chloride:** 250mg/l
**Total Hardness:** 100 mg/l
**Total Dissolved Solids:** 1,000 ppm

Environmental Sanitation

***Methodology***

A checklist was developed and used to collect information on waste management and disposal. Information obtained from the administration of the checklist was analyzed to assess the sanitation status.

***Solid/liquid Waste Disposal***

Waste disposal may result in soil and surface and groundwater contamination due to:

- Inadequate disposal of industrial solid or liquid wastes;
- Burning of industrial wastes;
- Unhygienic & inadequate toilet facilities; and  Inadequate sludge disposal.

There is no proper way of disposing of solid waste within the communities. Most waste is dumped in temporary dump sites at random points within the communities, as was observed, or most commonly, thrown into the bush. The waste products from local palm oil production are dumped into the nearby watercourses, bushes or are burnt.

***Waste Disposal within the Settlements***

Solid wastes generated by households within most of the villages are dumped into nearby bushes. In a few villages, however, some temporary landfills were observed. Some individuals have compost pits in their backyards for manure production.

Palm oil production is a vibrant activity undertaken by the women in each of the villages identified. Local mills for palm oil production are invariably located close to the palm oil plantations mainly adjacent to streams and also to the Little Scarcies River. Most waste products (solid and liquid) from local palm oil production are dumped into such nearby water sources.

***Sewerage Disposal***

**Sewerage Disposal within the Villages**

The most common method of sewage disposal amongst the residents of the prescribed project affected communities is via bushes and traditional open pit latrines. Most people walk into the nearest bushes to excrete. Only one of the surveyed villages, Kawena, has a Ventilated Improved Pit (VIP) latrine, located at its health centre. The VIP latrine has a pipe fitted to the pit, and a screen at the top outlet of the pipe. The smell is carried upwards by the chimney effect and flies are

prevented from leaving the pit and spreading diseases. The only flush toilet located within these settlements was also at Kawena. The waste collected in a septic tank will be emptied manually when filled.

The pit latrines are dug-out, using simple tools, into circular or rectangular holes in the earth. The circular pits measure between 3ft - 4ft in diameter while the rectangular pits have dimensions of approximately 3ft - 4ft by 6ft -7ft. The depths of the pits vary depending on the climate, the water table and the resistance of the parent soil material, but normally range from 2 to 3 metres in depth. Dug out latrines are simply narrow holes dug on the ground and used as latrines. When filled, they are covered with earth and abandoned. This type is used either by squatting with the users' legs straddling the pit or they could be fitted with sits or leaning post for support to allow some comfort to the user. One advantage of dug-out pits is that abandoned pits can then undergo anaerobic reactions, eventually returning viable nutrients back into the soil. This means that waste is controlled and decomposed into harmless by-products.

A health hazard associated with the use of dug-out pit latrines is that they can become flooded during the rains. The make-shift structures, within which they are contained, are mostly roofless therefore permitting rain and runoff water to enter directly into the dugout pits. The runoff from the flooded latrines could possibly enter into drinking water systems that serve the communities. Methane gas collection is another possible hazard, created by the decomposition of human waste.

Pits are emptied the traditional way. When the latrines are filled, an adjacent hole is dug into which the waste drains. The new pit is then covered with earth. In some cases, the pit is covered and abandoned, and a new pit is dug at a different location. See table 3.17 below for the list of the various sewerage disposal methods in the settlements.

**Table 5.17: Types of Toilets in Surveyed Settlements**

| **Chiefdom** | **Village** | **Sewerage Disposal Method** | | | |
|---|---|---|---|---|---|
| | | **Bushes/watercourses** | **Pit latrines** | **VIP Latrine(s)** | **Flush toilet(s)** |
| **Mange Bureh** | Mange Morie | ✓ | ✓ | | |
| | Matete | ✓ | ✓ | | |
| | Konta Wusi | ✓ | ✓ | | |
| | Rosint | ✓ | ✓ | | |
| | Yele Sanda | ✓ | ✓ | | |
| | Masimera | ✓ | ✓ | | |
| | Rokupr Rosi | ✓ | ✓ | | |
| | Konta Ferry | ✓ | ✓ | | |
| | Masese | ✓ | ✓ | | |

| | | | | | |
|---|---|---|---|---|---|
| | Kalangba | ✓ | ✓ | | |
| | Masimbo | ✓ | ✓ | | |
| | Gbela | ✓ | ✓ | | |
| | Bantoro I | ✓ | ✓ | | |
| | Mayorsor | ✓ | ✓ | | |
| | Cimbeck | ✓ | | | |
| | Mamanka | ✓ | | | |
| | Magbaft | ✓ | | | |
| | Mangata | ✓ | | | |
| | Making | ✓ | | | |
| **Marconteh** | Malal | ✓ | ✓ | | |
| | Made | ✓ | ✓ | | |
| | Making | ✓ | ✓ | | |
| | Faidugu | ✓ | | | |
| | Mabain | ✓ | ✓ | | |
| **Kasseh** | Romene | ✓ | ✓ | | |
| | Gberi | ✓ | ✓ | | |
| | Kabangtama | ✓ | ✓ | | |
| | Kawega | ✓ | ✓ | ✓ | ✓ |
| | Komrabai | ✓ | ✓ | | |
| | Maranka | ✓ | ✓ | | |
| | Rotifunk | ✓ | ✓ | | |

*Source: Survey Data*

### *Conclusion*

Solid/liquid waste management is poorly practiced in the villages. The poor disposal methods have possibly deposited high levels of polluting components into the Little Scarcies River and surrounding streams. But within the villages, the waste would eventually put nutrients back into the soil.

It is however essential for sewage and garbage dumping sites to be properly constructed to prevent contamination of surface water and groundwater sources within the communities. The selecting of dumping sites should be conducted as recommended by WHO standards. We recommend that all soft garbage be composted for use as manure.

# CHAPTER 6: SOCIO-ECONOMIC BASELINE ASSESSMENT

## District Profile

Port Loko district is in the Northern Province and is the fourth most populous district in the country. Port Loko borders the Western Area to the west, Kambia district to the North, Bombali district to the East and Tonkolili district to the South. The 11 chiefdoms of the district are Bureh Kasseh Maconteh (BKM), Buya Romende, Dibia, Kaffu Bullom, Koya, Lokomasama, Maforki, Marampa, Masimera, Sanda Magbolontor, and Tinkatupa Maconteh Safroko (TMS). Lunsar is the district's largest Town, and other major towns are Masiaka, Rokupr, Lungi, Gbinti and Port Loko town. The population is predominantly Muslim (80%) and the largest ethnic group is Temne.

**Population distribution**: The population distribution by age group and gender indicates that 49% of the district populations are of working age. 29% of the population is children in the 5-11 years age group, according to Population and Household Census 2015, and many of them, particularly in rural areas, are engaged in domestic or other forms of labor/economic activities. According to the population statistics, some 18% of the district population is below 5 years old. Almost 89% live in the district's rural areas.

**Livelihood and Economy**: Production of food crops, such as rice, cassava and sweet potato, are the main livelihood sources for over 80% of the population. Small scale mining also takes place. The city of Port Loko is a major trade center in the Northern Province. The areas around Port Loko are known for bauxite mining. The SL Mining Company, which operates iron-ore mining in Lunsar and Marampa, is a major employer in the area. Hiring labor and exchange workers are seasonal activities during the plantation and harvesting season from which the farming communities generate income. The Wealth Index (WI)4 indicates that 26% of the district population falls into the poorest quintile, while 33% fall under a medium poor rating. Port Loko has the second highest portion of households (59%) in the two poorest quintiles.

**Education:** According to the Ministry of Education Science and Technology's (MEST) school census in 2017, there are 687 schools in the district, of which 39 are pre-primary, 512 are primary, 111 are junior secondary, and 25 are senior secondary schools. Port Loko has the second highest number of schools in the country after Freetown City. The MEST recorded an increase of 30 schools (17 pre-primary, 6 junior and 7 senior high schools). The majority (63%) of the schools are missionary, community or private schools, with the remaining 27% government schools. The net primary enrollment rate is 57.5%. Educational attainment is higher among boys compared to girls in all three school levels. The average teacher-student ratio for the district is 1:47. The overall literacy rate is 32%. The Port Loko Teacher's College now upgraded to a University is one of the oldest and best-known colleges in Sierra Leone.

**Food Security**: The Emergency Food Security Assessment 2015 report shows that over 52% of the District's residents are moderate to severely food insecure, while 40% are marginally food

insecure. 92% of the District's residents are facing some form of food insecurity. The report projected that the 2015 total rice production will be lower compared to 2014, as farmers were unable to work in their fields due to movement restrictions and fear of contracting Ebola. Crop production is the most vital livelihood source for the majority of the population, but this source of livelihood was the most adversely affected during the EVD outbreak. The Coping Strategy Index (CSI)10 has significantly increased from 6% in 2010 to 13% in 2015, which implies that people have reduced meal portions and/or eat less of their preferred foods. The CSI trend is alarming and is an indication of increased vulnerability in the district. Food purchase8 accounts for 61% of household expenditure, which reduces the purchasing power of people. This compromise both the quality and quantity of other essential necessities, such as Health, Education, and Family Welfare.

**Health:** The Port Loko Government Hospital and Lungi Government Hospital are the two main heath facilities in the district. These hospitals have 5 doctors, 6 midwives, 37 nurses and 8 technicians. On average, one health facility serves 477611 people, and the population per hospital is 151,249. 65% of children aged between 12-23 months have completed a full course of vaccination against the most common diseases (BCG, DPT, Polio and Measles), while 5% of children of the same age group did not have any vaccinations at all. During the Ebola response, a few organizations, such as CDC, IMC, IRC, GOAL, Marie Stopes, Plan International, Partners in Health, OXFAM, UNFPA, WHO, UNICEF, WFP, IFRC, Christian Aid, Restless Development and the District Health Management Team (DHMT) were actively involved in the response, surveillance, contract tracing, quarantine, managing the treatment centers (Ebola Treatment Centers) etc.

**Water and Sanitation: (WASH)**: The Sierra Leone 2015 population and Housing Census indicated that 44% of households did not have hand washing (water, soap or cleansing agents) facilities within the household, while only 11% have the full range of hand washing facilities at the household level. During the Ebola outbreak, a nationwide campaign for hand washing (with soap, chlorinated water, hand sanitizer or combination) was launched. The MEST school census 2017 indicated that 54% of schools do not have water sources in the compound, only 6% of the schools have pipe borne water supplies, 30% of schools have boreholes, and the remaining 64% of schools relied on water from wells, streams, and other sources. Only 68% of the schools have toilet facilities in the compound with the conditions and cleanliness widely varying by school. A number of organizations (UN and NGOs) are working in the WASH sector namely UNICEF, CAWeC, GEKO-SL, DIP, GOAL, OXFAM, Plan International, World Hope, Health Education Department, Ministry of Health and Sanitation (MOHS), ISLAG/CHRISTAG and SMAC.

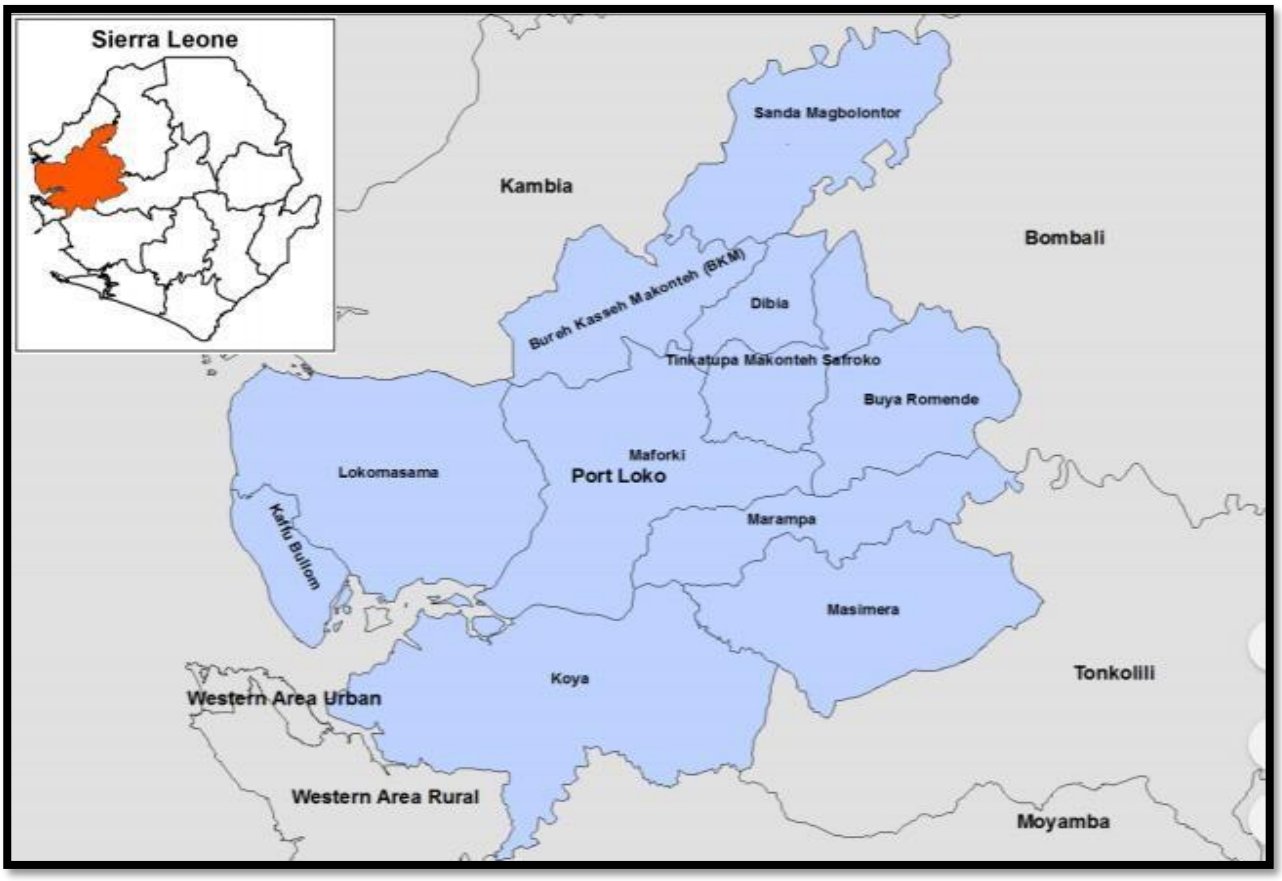



*Figure 6.1 above: Map of Port Loko and other districts*

*Project Area Context*

According to the 2015 population and Housing Census, the project Area, Bureh, Kasseh, Maconteh, Kamasondo and Bakeh Loko falls within Constituency 68 of the Port Loko District Constituencies. The total population of BKM Chiefdoms are shown in table 6.1 below;

| CONST NO. | CHIEFDOM | SECTION | EAs | TOTAL POPULATION |
|---|---|---|---|---|
| | Maconteh | Kaiyeabor | | 4,171 |
| | | Mabombo | | 3,069 |
| | | Minthormore | | 2,762 |
| | | Kambia Morie | | 2,620 |
| | | Konta Ferry | | 561 |
| | | Kalangba | | 5,157 |

| | | | | |
|---|---|---|---|---|
| **68** | Bureh | Makana | | 1,931 |
| | | Rogbla | | 1,466 |
| | | Mamanka | | 1,053 |
| | | Mange Morie | | 1,686 |
| | | Yali-Sanda | | 1,192 |
| | Kasseh | Barmoi | | 2,444 |
| | | Kagbanthama | | 2,024 |
| | | Marenka | | 4,866 |
| | | Romeni | | 2,179 |
| | | Rotifunk | | 2,998 |
| | Kamasondo | Katonga | | 3,562 |
| | Bakeh Loko | Gberray Morie | EA (1 to 9) | 2,998 |
| | | Malal | | 3,654 |
| | | Tauya | | 1,121 |
| | | **TOTAL** | | **51,514** |

***2015 population and Housing Census***

*Land Tenure*

By its colonial legacy, Sierra Leone has two broad categories of tenure: freehold in the Western Area (the former British Crown Colony) and Sherbro Urban, and leasehold in the provinces (the former British Protectorate). While private ownership exists in the Western Area, land in the provinces is communally owned by the indigenes with title vested in the Paramount Chiefs.

Gilpin and Gray assessed the different types of customary tenure in Sierra Leone – de facto private ownership, secondary tenure, community ownership, begged ownership and leased ownership. They concluded that factors (such as price incentives and infrastructural support) play a more

important role in determining land use patterns in Sierra Leone than land tenure. Other main conclusions were as follows:

- The monetization of the economy has led to a de facto ownership of land in major provincial towns;
- Several studies have concluded that commercial tenants, missionaries, public works and mining companies have found it relatively easy to get leases; and
- The adaptable nature of land tenure in Sierra Leone suggests that potential investors will be able to work within (or modify) the technical framework as they have done in the past.

They however recommended that there was need to improve the legal framework for leased or begged land to provide tenants with more security. There was also ne6.ed to properly survey and codify land in various places in the country.

Respondents reported four main methods of land acquisition for farming. These are family, communal, lease and begged. Very few heads of household members own land, except for small patches of backyard fields owned by house owners. For farming purposes, these people beg the PC, the village chief and/or head man to rent or lease farm land. Acquisition of land in the study area for farming is not difficult.

***Credit Facility***

Access to credit either for farming or business is very limited in the study area. There are very few financial institutions such as banks and cooperatives, which usually give credit/loans for such activities.

***Planting Materials and Agro-chemicals***

The Port Loko District economy is predominantly agriculturally based, especially as the majority of the able working population of the District depends on agriculture for their livelihood. However, food production is still at subsistence level and mechanized commercial farming is non-existent.

Farmers in Port Loko District and most rural areas barely benefit from associations to support their farming activities because they are subsistence farmers. Port Loko District has also benefitted from the new agricultural programme (commercial farm input) by the Government of Sierra Leone

whereby farmers are given tractors in exchange for money in order to promote commercial and mechanized farming. Also, it is with the view of economically empowering the people (especially youths and women) and thereby reducing poverty in rural communities.

***Extension Services***

Contact with extension agents and access to extension services (credit facility, vocational training) are available in the Port Loko District center. Most of these services are offered by the Ministry of Gender Women and Children Affairs, different International NGOs and national NGOs.

***Women in Development at the National and District Levels***

Women provide more than 65% of the work force in food and agricultural production. The contributions of women to agriculture have nevertheless often been under represented, a major reason for their neglect by most agricultural development programmes in the country over the years. Thus, women are marginalized and constrained in their access to production resources and extension services, which adversely affects their farming activities. In order to redress this situation, women and their needs must be mainstreamed in development, not only because of equity concerns but also from the realization that sustainable development cannot be achieved if the women are left in the fringes of development efforts

As is common in most other areas there is a complete division of labour between men and women in the study area. Women are engaged in all aspects of swamp cultivation except for the more energy-demanding jobs such as land clearing and digging. In addition to this, women are dominant players in the cultivation of vegetables and other crops.

Women also have additional responsibilities in the preparation of food for the family and also caring for the younger members of the family. Food preparation is tedious and time consuming and involves the collecting of wood, water and vegetables. Women encounter a number of constraints which can best be explained in terms of the dominant culture and religious milieu of the proposed project region.

The culture of the study area is based on patrilineal tendencies where the males are dominant. This male dominance phenomenon always places women as second-class citizens. The dominant

Muslim religion in the communities along the road also supports the secondary role played by women in these communities. Inheritance of land by women is a problem.

The heavy workload and poor access to capital places women in a vicious cycle of poverty, thus they are only able to cultivate smaller areas for immediate consumption. Access to healthcare, credit, educational and market incentives is difficult for women in the area.

In Port Loko District, women account for 53.1% of the total population (2015 Population Census). They contribute to the provision of most of household food requirement. Including domestic chores and caring for the vulnerable groups. The women who generally have access to formal employment result to petty trading and food production earnings. These exercises enable women to feed their dependent and also take care of school cost.

Illiteracy rate is very high among women and sufficiently higher than that for men in the limited number of schools along the road. Enrolment is higher in the case of boys than girls. Girls also drop out of school earlier for early marriages. This situation is compounded by higher household demand for female labour; although, life expectancy for women is 41.3 years which is relatively higher than that for men. Their health status is very poor due to high fertility rates of (6.1) children per woman, work related stress, extremely high material mortality rates and inadequate supply of food nutrient. This poor situation of women in Port Loko District is not different from the national average.

***Gender Division of Roles during Farming***

There is complete division of labour based on gender during the various stages of the farming calendar. Swamp development in the study area entails a series of activities, which include brushing, burning, digging and channel construction. During these stage men are the key players while women help play prominent roles in planting, weeding and harvesting. These role divisions are only customary, but in fact women do assist the men whenever and wherever it is physically expedient. For example, both men and women may carry out the burning and leveling activities, even though men dominate in these operations.

The second stage of swamp rice cultivation is the nursing of seed rice, up-rooting and transplanting of the up-rooted rice and weeding. Men and the women share in the rice nursing activity, while

mainly the women do the uprooting of the nursed rice. The men dominate the transplanting, but the women help when and as necessary. Weeding is done entirely by the women.

The third stage of the swamp rice production process involves activities such as bird scaring, harvesting, and conveying the harvested bundles of rice to threshing sites, threshing, winnowing and transporting the winnowed rice to storage places. The study revealed that the women and children do the bird scaring, while harvesting is a combined responsibility of the men and women. The women and older children carry the harvested rice to threshing sites while the men do the threshing. The women do the winnowing and carry the winnowed rice to storage places.

The women have the important and additional responsibility of preparing food for the family and any hired labour during the farming period and beyond. This activity is tedious and involves collection of fuel wood and water (sometimes from far distances) as well as obtaining vegetables from back gardens.

***Income Generating Activities for Women***

As in most Muslim dominated areas, women hardly play a major part in any decision making relating to development. Nonetheless, they play significant roles in the production process in all the areas visited. They are involved in the cultivation of minor crops, palm oil processing and vegetable gardening, which empower their economic activity.

***Problems/Constraints Encountered by Women***

Most of the women in the study areas are illiterates and are therefore poorly informed about modern techniques of farming and how to benefit from extension services. This problem may be passed on to Adult Literacy Providers to help in this regard.

Some women also reported the difficulty of finding easily available market outlets for their farm produce because of non-existence of market in the project area.

***Gender, Children and the Vulnerable***

Children and the vulnerable constitute the most powerless and poorest groups in the rural communities especially as these bear the heaviest burden of acute poverty and deprivation.

Coupled with the gender disparity, particularly the marginalization of women, this sector faces major problems and challenges, including limited access to income earning activities and to food, in availability and poor affordability of medical and educational services, high rate of sexual and other abuses, and social stigmatization and discrimination. Children often end up as street children and leaving under poor shelter, health and nutritional conditions, when they lose one or both parents, or when the income source of the family diminishes and fails. Also, the education of the girl child is still neglected in the District as women are generally considered as mere homemakers and child-bearers than anything worthy of profitable service.

## Study Area

The socio-economic and living conditions in the project area were analyzed about the establishment of Rewilding Maforki Project in the BKM Chiefdoms in the Port Loko District.

The study covered the chiefdoms of the Bureh, Kasseh and Maconteh. The impact assessment covered the Bureh, Kasseh and the Maconteh Chiefdoms.

The socio-economic survey covered twenty three (23) Villages within Bureh Chiefdom- Bantaro I & II, Cimbeck, Kalangba, Konta Wusi, Konta Ferry, Limba Corner, Mabain, Magbaft, Makane, Making I & II, Mamanka, Mangata, Masimbo, Masimera, Masisi, Mateti, Rokupr Wusi, Rosent, Yelisanda and Yonkro in the Port Loko District of the northern region of Sierra Leone.

The location and description of the study area is already covered under location and accessibility.

## Methodology

### *Field Survey*

A survey was carried out in eight (8) days within the concession area of the proposed project in the BKM Chiefdoms of the Port Loko District by the Environmental and Socioeconomic Impact Assessment (ESIA) team of Ecoworld (SL) Ltd. in order:

- To assess the nature and scope of environmental and socio-economic impacts of Rewilding Maforki project in the area;
- To assess the nature of tree planting activities in the area;

- Enquire the people's perception and concerns about Rewilding Maforki project; and
- To hold consultations with representatives of various stakeholders – such as the local authorities, the land owners' families and other interested stakeholders within the communities.

Courtesy calls were paid to the Paramount Chief, the Section Chiefs, the Regent and the Town Chiefs on different occasions during which they were briefed about the mission of the EIA team in the chiefdom and the objectives of the environmental and social impact assessment that is being conducted on behalf of Rewilding Maforki.

The EIA team solicited the support of the local authority and that of the entire communities during the conduct of the survey. Prior to the baseline field survey, a reconnaissance visit was paid to the same local authorities in order to source information that will aid the implementation of the survey and to seek permission to carry out the baseline survey.

About 170 household respondents within the study area were interviewed and they form the basis of the socio-economic assessment surveys.

Four (4) focus group discussions were held – two (2) for the Bureh Chiefdom, one (1) for the Kasseh Chiefdom and one (1) for the Maconteh Chiefdom.

*Data Collection*

Inventory checklists and a household questionnaire were developed for this survey which aided the gathering of relevant data that were used for analysis by the socio-economic team. These are mentioned as follows:

***Infrastructural Checklist***

An infrastructural checklist was developed to collect vital information in the settlements on the number and status of existing infrastructure such as the type of houses, educational facilities, health units, water and sanitation facilities, market and local government infrastructure.

***Historical and Farmers' Operations Checklist***

The historical checklist aided in knowing the first settlers of these settlements and precisely when these settlements occurred.

The farmers' operation checklist aided in knowing how the farmers and any other primary occupation present in the area operate generally, whether they have an organization; what rules and laws govern such an organization; the kind of labour employed; and if they pay taxes or receive help from the government or nongovernmental organizations.

***Focus Group Discussion Checklist***

The checklist of questions for the focus group discussion solicited information mainly on the perceptions of the impacts the oil palm processing operations will have on the communities. Mitigating measures to reduce negative impacts that might likely occur were discussed. Also discussed were the necessary community needs and expectations (see focus group discussion summary).

***Household Questionnaire***

The household questionnaire solicited mostly personal information about the household heads, their perception on the oil palm operations and health and sanitation issues.

*Sampling and Sample Size of Household Questionnaire*

The basic sampling unit for the survey was the household heads or their representatives as the main respondents. 170 respondents were sampled in Bureh of the BKM Chiefdoms. 75.3% and 24.7% of the respondents were females and males respectively.

*Questionnaire*

The questionnaire solicited data from about 170 household heads in all the communities, who were randomly selected from the study areas.

Data was sought on selected socio-economic variables such as household demography, economic activities and income, social services such as access to health facilities, water and sanitation, disease prevalence, knowledge of HIV/AIDS, housing and educational infrastructure and facilities.

Data was also collected on their perception of the likely impact the oil palm operations will have on their lives and the community.

The questionnaires were administered face-to-face by trained enumerators in both Krio and Temne languages, Temne being of the main media of communication in the District. These interviews which lasted for about 20 - 25 minutes were conducted mainly in the daytime but also during the night whenever possible because of the inadequate duration of the field survey. The enumerators carefully crosschecked responses in order to reduce observational errors arising from the use of this method. At the end of each day, the team met to share their field experiences as well as to identify ways of overcoming potential problems.

Duration

Fieldwork lasted for eight (8) working days and the data analysis was done for another five (5) days.

Analysis

Percentages, means and averages were used to interpret the data. These data presentations are mainly in text and tabular forms.

Historical Sketch

***Konta Ferry***

This village was founded some 200 years ago by pa one Pa Alimamy Momoh. The village was named after a strong tree called Konta at the demarcated boundary. The first settlers' struggled to maintain its sovereignty and succeeded. The village is in ward CLXXXII of the local government system.

***Kagbatama Village***

Kagbatama was founded by Pa Santigie and Pa Juma four years before the Hut Tax war of Bai Bureh. The name literally means 'meeting point' especially for farm work.

***Mamanka Village***

Mamanka village was founded in 1940, even before Sierra Leone gained independence. It was founded by Pa King Gboko, who was the father of Pa Ansumana Papa. Literally, the village name means ‘’keep food’’ for someone who is not around, as there was food scarcity in the locality in the early 1940’s. Anytime a family member or friend went out the people requested that they brought back food on the return.

The village is in ward CLXXXII of the local government system.

***Magbaft Village***

Magbaft **V**illage was founded in 1964 by Pa Shaka Bangura. Magbaft in Temne means wide area; it was initially an open area where people met to trade in fish. Pa Shaka Bangura was the first to construct a house and convert the empty space to a settlement.

The village is in ward CLXXXII of the local government system.

***Masimera Village***

Masimera was founded around 1915 by Pa Mesimera Sesay, hence the village was named after the founder. Mesimera in Temne means “strength” as Pa Mesimera Sesay was a strong man who was never defeated in a fight.

The village is in ward CLXXXII of the local government system.

***Masisi Village***

Masisi is one of the oldest villages in the locality; it was founded around 1850 by Pa Sorie Thantho Kamara who was a warrior. Masisi literally means to come, see and settle. This settlement was founded during the Temne – Loko tribal war as a safe place for Pa Sorie’s family. During the said war he convinced members of his family to migrate with him hence the invitation became - come, see and settle. The village is in ward CLXXXII of the local government system.

***Mangata Village***

Mangata Village is believed to be as old as Masisi, it was also founded in 1850 by Pa Sumana Kargbo - a deaf tobacco trader. As narrated by the old ones in the village, buyers had to shout before the deaf trader could hear them; hence the name of the village was derived from that situation, which could be termed that Mangata means shouting. The village is in ward CLXXXII of the local government system.

***Mayorsor Village***

Mayorsor is in the Makane Section and was founded by Pa Gbonkineh Kamara even before the 1896 Hut Tax war as the founder was a warrior in the said war. The village itself has been moved from its original position for the third time to its current relocation in 1937. The village was originally called Gbonkineh but was changed to Mayorsor which literally mean 'never do it again'. This was because of the punishment levied on one of the slaves of Pa Gbonkineh who was sentenced to death for killing one of his master's sons.

The village is in ward CLXXXIII of the local government system.

***Mange Mori***

Mange Mori is a very old village and believed to be about 200 years old. The village was founded by Pa Bahinga Juru a descendant from Guinea. Mangai in the Susu language means chief and Mori means over here.

The village is in ward CLXXXII of the local government system.

***Kalangba Village***

Kalangba Village was founded over 200 years ago by Pa Kpolo, Kalangba in Temne means 'land for men'. At the time of its establishment, there were wild animals around the locality hence women were not encouraged to settle there because of fear of being attacked by some of these wild animals.

The village is in ward CLXXXII of the local government system.

***Mateti Village***

Mateti Village is one of the oldest settlements in the locality founded some 250 year ago by Pa Kankui. Mateti was the location where warriors settled, and the enemies were prevented from entering the village.

The village is in ward CLXXXII of the local government system.

***Yelisanda Village***

This village was founded some 200 years ago by a woman called Kande Bonkie. The founder migrated from Sanda (means up country) with her sister called Yeli and settled, so they decided to name the location after her Yelisanda which means Yeli from up country.

The village is in ward CLXXXII of the local government system.

***Yonkro Village***

Yonkro was founded some 200 years ago by Pa Amara Bankit and Pa Bundu Messah. The original name of the village was Kanthenti, which means there was an intruder that came in to fight but was met with resistance. However, the name has now been changed to Yonkro – meaning highland.

The village is in ward CLXXXII of the local government system.

***Rosent Village***

Rosent village was founded about 200 years ago by Pa Sokei Pantani Sokei. Rosent means 'sandy place'. As the name implies the entire village is sandy. The village itself had been moved from its original settlement for the third time first due to disaster in the old settlement and then due to the rebel war.
The village is in ward CLXXXII of the local government system.

***Konta Wusi Village***

Konta Wusi Village is one of the oldest settlements in the locality founded about 250 years ago by Pa Momoh. Konta means “dry” and Wusi means ‘stick’ hence the name Konta Wusi literally means ‘dry stick’. The founder discovered a lot of dry sticks in the area when he migrated there.

The village is in ward CLXXXII of the local government system.

**Maconteh Chiefdom**

***Mabain Village***

Mabain Village in found in the Maconteh of the BKM Chiefdoms. The village was founded some 150 years ago by Pa Kapralahai Poto, Pa Gbapu and Pa Mtinke. Mabain literally means ‘temporal accommodation’. During the periods of fighting for land in the chiefdom, Mabain was the place where the fighters could converge, pass the night and decide on their next strategy; hence the name was given as temporal accommodation.
The village is in ward CLXXXII of the local government system.

***Fairdugu/Forodugu Village***

Fairdugu Village was founded in 1930 by Pa Fairdugu Conteh hence the village was named after the founder Pa Faidugu.

The village is in ward CLXXXII of the local government system.

***Masainbo Village***

The village was founded some 150 years ago by one Pa Sorie Kekor. Masinbo means ‘neglect the popular’. There was a revolt on a popular chief who was collecting tax and it got to a stage where the people refused and challenged him saying that if he neglects them they would not pay their tax. The village is in ward CLXXXII of the local government system.

Local Administration

Konta Ferry, Rosent and Rokupr Wusi are found in Mange Section; Mayorsor, Bantoro I & II, Making I & II, Masimera and Cimbeck are found in the Makane Section; Mamanka is found in the

Mamanka Section; Mange Mori is found in the Bureh Section; Mateti, Kalangba, Konta Wusi are found in the Kalangba Section; Masainbo, Yelisanda and Yonkro are found in the Yelisanda Section; Magbafti, Masisi and Mangata - these villages are found in the Bureh Chiefdom of the BKM Chiefdoms.

The rapid assessment implemented in Maconteh Section covered Fairdugu/Forodugu, Malal, Made, Mabian and Making Villages while Gberi-Kasse, Kagbantama, Marenka, Kawenga, Komrabia, Romeni and Rotifunk were the sampled villages in the Kasseh Chiefdom

Each of these villages is headed by the village headman or town chief, who is also head of the village councils/administrations. The village headman has an assistant and are together responsible for the day-to-day administration of the settlements. There are also tribal heads, representing their various tribes.

Each of these villages has a Village Development Committee and a youth committee, each of which is headed by a chairman and assisted by his deputy and a Secretary.

Findings

*Sampled Population*

The total number of sampled household heads for each village is illustrated in Table 6.2.

**Table 6.2: Sampled Respondents and Estimated Population**

| Village | No of Houses | Estimated Population | Sampled HH Heads |
|---|---|---|---|
| Konta Ferry | 45 | 450 | 15 |
| Mamanka | 44 | 490 | 13 |
| Magbaft | 9 | 80 | 2 |
| Masimera | 13 | 140 | 5 |
| Masisi | 35 | 400 | 12 |
| Mayorsor | 38 | 220 | 10 |
| Mange Morie | 200 | 1,500 | 45 |
| Kalangba | 35 | 350 | 10 |
| Mateti | 25 | 200 | 20 |
| Rosent | 37 | 350 | 8 |
| Konta Wusi | 38 | 320 | 12 |
| Yelisanda | 16 | 160 | 9 |

| | | | |
|---|---|---|---|
| Yonkro | 16 | 150 | 3 |
| Masimbo | 22 | 200 | 4 |
| Mabain | 44 | 400 | 2 |
| **Total** | **-** | **-** | **150** |

The villages with least number of sampled households were those villages where rapid assessment was conducted.

*Housing Structure*

The houses in the villages are constructed with the following types of materials:

- Cement blocks with corrugated iron sheet roofs;
- Mud bricks with either thatch or corrugated iron sheet roof; and
- Mud brick houses with cement plaster.

For detailed description of these types of houses found in the study area refer to the section on infrastructure.

*Household Respondent Characteristics*

This section analyses data on the demographic characteristics of the household respondents sampled. It includes age, marital status, gender, occupation, income level, level of educational attainment and household size. The household questionnaire mostly solicited personal information from household heads, regarding their perception on the socio-economic facilities and oil palm plantation ownership and respondent's perception about the proposed project. The survey covered twenty settlements in the Bureh Section.

*Household Unit and Size*

The extended family is the type of family found in these settlements (refer to table 6.3), which consist of several household members spanning many generations. Multiple families residing within the same house is also a typical residential arrangement in this settlement.

**Table 6.3: Types of Household**

| Types of Household | Frequency | Percent (%) |
|---|---|---|
| Nuclear family | 9 | 5.3 |
| Male single parent | 4 | 2.4 |
| Female single parent | 3 | 1.8 |
| Polygamous family | 28 | 16.5 |
| Extended family | 126 | 74.1 |
| **Total** | **170** | **100.0** |

Polygamous families were observed in these settlements, but these were not in the majority. Those who practice polygamy, mainly marry 2 to 3 wives. The sizes of the households interviewed by the survey were large. Most of the respondents' households consist of over eight people and more. This data provides useful demographic information with respect to the demands that are often made on household heads to support many people, although they have very limited income.

*Respondent's Gender Distribution*

It is quite expected that in a male-driven society like Port Loko District, there may be more male than female respondents. The survey methodology however tried to maintain gender equity among the household respondents, and to be consistent with the female/male population ratio as indicated in the 2004 National Census Report. Although, the male dominance is maintained in the study area, the female sample is not significant enough to present an adequate female perception. Of the total respondents interviewed,

75.3% were males (Table 6.4)

**Table 6.4: Respondents' Gender Distribution**

| Respondent Gender Type | Total No | Percent (%) |
|---|---|---|
| Male | 128 | 75.3 |
| Female | 42 | 24.7 |
| **Total** | **170** | **100.0** |

***Source: Survey Data***

*Age and Age Distribution*

The age ranges of the household members of the respondents were investigated, Table 6.5 illustrates that the population (59.3%) of the economically less and dependent group (i.e. age groups 6 years and below, 7 to 17 years and 60 years and above) exceeds that of the economically active and production groups (40.7%) (i.e. 18 to 44 years and 45 to 60 years).

**Table 6.5: Age Range of Household Members**

| Dependants' Category | Frequency | Percent |
|---|---|---|
| **Less than 6 years** | | |
| Male | 150 | 54.7 |
| Female | 124 | 45.3 |
| **Total** | **274 (22.6%)** | **100.0** |
| **7 years to 17 years** | | |
| Male | 133 | 48.1 |
| Female | 143 | 51.9 |
| **Total** | **276 (22.7%)** | **100.0** |

| | | |
|---|---|---|
| **18 years to 44 years** | | |
| Male | 136 | 48.9 |
| Female | 142 | 51.1 |
| **Total** | **278 (22.9%)** | **100.0** |
| **45 years to 60 years** | | |
| Male | 121 | 55.8 |
| Female | 96 | 44.2 |
| **Total** | **217 (17.8%)** | **100.0** |
| **61 years and above** | | |
| Male | 88 | 51.8 |
| Female | 82 | 48.2 |
| **Total** | **170 (14.0%)** | **100.0** |
| **Grand Total** | **1,215** | |

***Source: Survey Data***

*Religion*

The Muslim religion is rife in the area as is evidenced by the occurrence of at least a mosque in every one of the settlements. A total of nineteen mosques were recorded in ten settlements. These Mosques are generally small house structures constructed in mud bricks that is sometimes plastered with cement, with either thatch or corrugated iron sheets roofing. The best constructed of these mosques are two to be found in the town of Mange.

Christians are not significantly represented in the project area, but few churches were identified. There is at least a church in any settlement but there are three churches in Mange Town the chiefdom headquarters. The following are the most common church denominations are Roman Catholic and Baptist.

*Marital Status and Family Type*

The survey findings show that marriage is still a highly respected institution in Port Loko District; about 86.5% of the respondents interviewed in the study area are married, 4.7% are widows and 2.9 are widowers and 2.4% are single (refer to table 6.6).

**Table 6.6: Marital Status of Respondents**

| Marital Status Household | Frequency | Percent (%) |
|---|---|---|
| Single/Never Married | 4 | 2.4 |
| Married | 147 | 86.5 |

| | | |
|---|---|---|
| Divorced/Separated | 6 | 3.5 |
| Widow | 8 | 4.7 |
| Widower | 5 | 2.9 |
| **Total** | **170** | **100.0** |

*Occupation and Income*

***Occupation***

Farming is traditionally, the primary income generating of communities in Port Loko. About 82.4% of respondents interviewed are farmers (majority of whom are subsistence farmers) while 7.1% are business/petty traders. This also indicates the fact that people are mainly self-employed in these communities as there are limited public and private institutions or companies that provide large scale employment opportunities. A variety of other occupations accounted for the rest of the responses.

Table 6.7 also illustrates the different secondary income generating activities of the respondents; 24.7% of the respondents were teachers, 22.4% are either business men or traders while 20.6% are into health related services.

**Table 6.7: Occupation of Household Heads**

| **Main Occupation** | | | **Secondary Occupation** | | |
|---|---|---|---|---|---|
| **Occupation** | **Frequency** | **Percent (%)** | **Occupation** | **Frequency** | **Percent (%)** |
| Health worker | 6 | 3.5 | Health worker | 35 | 20.6 |
| Teacher | 8 | 4.7 | Teacher | 42 | 24.7 |
| Business/trader | 12 | 7.1 | Business/trader | 38 | 22.4 |
| Farmer | 140 | 82.4 | Farmer | 32 | 18.8 |
| Fisherman | 1 | 0.6 | Fisherman | 9 | 6.3 |
| NGO/Social worker | 1 | 0.6 | Housewife | 1 | 0.6 |
| Civil servant/Local administrator | 1 | 0.6 | Civil servant/ Local administrator | 11 | 6.5 |
| Artisan (practical skills) | 1 | 0.6 | Artisan (practical skills) | 2 | 1.2 |
| **Total** | **170** | **100.0** | **Total** | **170** | **100.0** |

*Source: Survey Data*

***Income***

While the survey acknowledges that it is sometimes difficult to collate information regarding income level, attempts were made to capture an estimate of the respondents' household monthly income strength from both main and secondary sources. As illustrated in Table 3.23, 26.5% of the respondents earn between Le61,000 and Le100,000 per month, 19.4% earn up to Le60,000, 18.8% earn between Le101,000 to Le200,000, 14.7% earn Le1m and above, 2.9% earn between Le201,000 to Le400,000, 4.7% earn between Le601,000 to Le1m while 2.9% earn between Le401,000 to Le600,000 from their main occupation.

In the category of secondary sources of livelihood, 53.5% of the respondents interviewed replied that they earn between LeLe61,000 and Le100,000, 20.6% earn up to Le60,000,
12.9% earn between Le201,000 to Le400,000, 10.0% earn between Le101,000 to Le200,000, 1.8% earn between Le401,000 to Le600,000 while only 0.6% earn Le1m and above (refer to table 3.22 and figures 3.5 & 3.6 below). Majority of the respondents earn below the poverty line of 1US$ per day income from both the main and secondary occupations.

**Table 6.8: Main and Secondary Income Ranges**

| **Income Category (Le)** | **Frequency** | **Percent** | **Income Category (Le)** | **Frequency** | **Percent** |
|---|---|---|---|---|---|
| Up to 60,000 | 33 | 19.4 | Up to 60,000 | 35 | 20.6 |
| Le 61,000 - Le100,000 | 45 | 26.5 | Le61,000 - Le100,000 | 91 | 53.5 |
| Le101,000 - Le200,000 | 32 | 18.8 | Le101,000 - Le200,000 | 17 | 10.0 |
| Le201,000 - Le400,000 | 22 | 12.9 | Le201,000 - Le400,000 | 22 | 12.9 |
| Le401,000 - Le600,000 | 5 | 2.9 | Le401,000 - Le600,000 | 3 | 1.8 |
| Le601,000 - Le1m | 8 | 4.7 | Le601,000 - Le1m | 1 | 0.6 |
| Above Le1m | 25 | 14.7 | Above Le1m | 1 | 0.6 |
| **Total** | **170** | **100.0** | **Total** | **170** | **100.0** |

*Source: Survey Data*

*Educational Institution and Educational Status/Attainment*

The number, type and status of educational institutions as well as the educational status of inhabitants in the settlements were investigated. There are about 6 primary schools and 1 secondary school in the Bureh Section, they are namely – the District Educational

Council Primary School located at Mayorsor, Mamanka and Mateti; Mange Mori has 2 primary schools – the African Methodist Episcopal Primary School. The only secondary school – the Islam Academy Secondary School is located at Mange Mori.

On the educational attainment, 47.6% of the respondents did not go to school, 28.8% attained Arabic form of education, 7.6% completed primary education, 7.1% and 4.1% completed junior and senior secondary education respectively while only 4.7% attained tertiary education (refer to table 3.24).

**Table 6.9: Highest Level of Education Attainment**

| Education Level | Frequency | Percent (%) |
|---|---|---|
| Completed primary school | 13 | 7.6 |
| Completed Junior secondary school (JSS) | 12 | 7.1 |
| Completed Senior secondary school (SSS) | 7 | 4.1 |
| Completed Tertiary level | 8 | 4.7 |
| Arabic Education | 49 | 28.8 |
| Did not go to school | 81 | 47.6 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

*Affordability of Primary and Secondary Education*

As illustrated in table 3.25, 66.5% and 72.4% of the respondents indicated that the charges of primary and secondary education respectively are very affordable, 18.2% (primary) and 20.0% (secondary) say the charges are affordable while 15.3% (primary) and 7.6% (secondary) say the charges are unaffordable.

There was strong indication from majority of the respondents during the interviews that these charges are paid with much constraint.

**Table 6.10: Affordability of Primary and Secondary Education**

| Affordability of Education | Frequency | Percent | Affordability of Education | Frequency | Percent |
|---|---|---|---|---|---|
| Very affordable | 113 | 66,5 | Very affordable | 123 | 72.4 |
| Fairly affordable | 31 | 18.2 | Fairly affordable | 34 | 20.0 |
| Unaffordable | 26 | 15.3 | Unaffordable | 13 | 7.6 |
| **Total** | **170** | **100.0** | **Total** | **170** | **100.0** |

*Source: Survey Data*

*Health Infrastructure and Health Status*

The existence of health infrastructure in a community area determines how accessible and available health facilities are to inhabitants of such community. For health facilities to be easily accessible by the vulnerable, free health care has been introduced by the present administration through the Ministry of Health and Sanitation (MoHS) and there has been wide campaign over the media on how these facilities can be accessed.

The access and provision of basic health services are major concerns in most of the communities covered by the survey and a requisite condition for a healthy work force. This section focuses on the available health facilities and their charges.

There are some health facilities in the study area but these are considered poor and inadequate. There is a Government Hospital at Port Loko and 2 Community Health Units – 1 at Kalangba and 1 at Mange Mori. These 4 health facilities serve the entire project area. In addition to the services accessed by the inhabitants from these facilities, the inhabitants aside the pregnant women seek treatment from the Traditional Birth Assistants (TBAs). There are at least 2 TBAs in each village. Medications are sometimes bought from pharmacies wherever available and mobile drug peddlers.

The distance between the facilities and the villages depends on the location of each villages.

Table 6.11 illustrates that 45.9% of the respondents and their household members travel only less than a mile to access health facility, 25.3% travel between 1 to 3 miles, 8.8% travel between 4 to 5 miles while 20.0% of the inhabitant in the study area travel 5 miles and above before they access health facility.

**Table 6.11: Health Facility Distance**

| Health Facility Distance | Frequency | Percent |
|---|---|---|
| Less than 1 mile | 78 | 45.9 |
| 1 to 3 miles | 43 | 25.3 |
| 4 to 5 miles | 15 | 8.8 |
| Above 5 miles | 34 | 20.0 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

***Health Charges***

Interestingly, majority of the respondents considered the charges they pay for health services as somewhat affordable.

**Table 6.12: Affordability of Health Services**

| Affordability of Health Services | Frequency | Percent |
|---|---|---|
| Very affordable | 99 | 58.2 |
| Fairly affordable | 54 | 31.8 |
| Affordable | 14 | 8.2 |
| Unaffordable | 3 | 1.8 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

Table 6.12 illustrates that 5.2% of the respondents consider health service charges to be very affordable, 31.8% say they are affordable, 8.2% say they are affordable while only 1.8% say they are unaffordable. Like the constraints faced in paying for education, the health charges are also paid with much constraints.

***Prevalent/Common Sicknesses***

When respondents were asked about the most common sicknesses affecting their households, as shown in table 3.28, 91.2% say malaria is the most common sickness, 3.5% say they are afflicted by typhoid while 5.3% say they get afflicted with dysentery. It should be noted that most of the diseases are caused by common parasites or bacteria that could be prevented or controlled.

**Table 6.13: Most Common/Prevalent Sicknesses in the Study Area**

| Types of Sicknesses | Frequency | Percent |
|---|---|---|
| Malaria | 155 | 91.2 |
| Typhoid | 6 | 3.5 |
| Dysentery | 9 | 5.3 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

*Knowledge and Perception of HIV/AIDS*

The HIV/AIDS pandemic is causing serious developmental concerns, especially in Sub Sahara African countries like Sierra Leone. Its prevalence will cause havoc on any company's operation and development efforts. Poverty and high level of illiteracy have been reported as major contributors to the spread of the disease.

Given that poverty and illiteracy are pervasive among the sampled communities and households, their level of knowledge, attitudes and perceptions of HIV/AIDS transmission and prevention were sought. Also, the perceived influx of people employed or seeking employment when the oil palm company becomes fully operational may have implications on sexual behaviour.

A major strategy for the reduction of the rate of HIV/AIDS infection is the promotion and sensitization of accurate knowledge and awareness of how AIDS is transmitted and how to prevent transmission.

In soliciting information about the disease, an overwhelming majority of the household heads of about 92.9% (refer to table 3.29) have heard of the HIV/AIDS virus mainly from the radio, family members, friends or health workers (refer to table 3.30); as against 7.1% who have not heard.

**Table 6.14: Knowledge of HIV/AIDS Virus in the Study Area**

| Knowledge of HIV/AIDS Virus | Frequency | Percent |
|---|---|---|
| Yes | 158 | 92.9 |
| No | 12 | 7.1 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

**Table 6.15: Source of Knowledge**

| Source of Knowledge | Frequency | Percent |
|---|---|---|
| Health worker | 54 | 31.8 |
| Media (TV, radio, newspaper) | 113 | 66.5 |
| Family, Friend | 1 | 0.6 |
| School | 1 | 0.6 |
| Others | 1 | 0.6 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

Even though 91.9% of the respondents say they even have about the virus only about 28.8% of these respondents have tested for the virus while a majority of 71.2% do not their HIV/AIDS status. As revealed in the analysis this could be because of improper sensitization, lack of confidence and/or inadequate medical facilities in the study area. When the Company becomes fully operational, the Environmental Health and Safety (EHS) department could incorporate this into the Community Development Programme.

***Source of Infection***

The respondents were given several statements about the means of HIV/AIDS transmission and asked to state whether they believed the statements to be true or false. Analysis revealed that the sampled household heads are knowledgeable about the different means of believed that HIV/AIDS virus transmission; the analysis in table 3.30 illustrates the following order - transmission through infected needle or knife; sexual intercourse; through pregnancy, breastfeeding and through pregnancy (refer to table 6.16).

Generally, accurate knowledge of the means HIV/AIDS transmission is satisfactory amongst sampled household heads in the study area. For those without or inadequate knowledge, sensitization such as workshops from appropriate institution(s) could help combat the problem.

**Table 6.16: Source of HIV/AIDS Virus Infection**

| Source of HIV/AIDS Infection | Frequency | Percent | | Total |
|---|---|---|---|---|
| | | True | False | |
| Sexual intercourse | 170 | 67.6 | 32.4 | **100.0** |
| Blood Transfusion | 170 | 59.0 | 41.0 | **100.0** |
| Piercing with an infected object (Knife, needle etc.) | 170 | 76.5 | 33.5 | **100.0** |
| During Pregnancy | 170 | 65.2 | 34.8 | **100.0** |
| Mother to child through breast feeding | 170 | 62.4 | 37.6 | **100.0** |

*Household Access and Usage of Water and Sanitation Services*

Access to safe drinking water and sanitation facilities is an essential component of public health, welfare and well-being. To determine the effectiveness of these services, this study sought to evaluate the provision and access, perception of households in the localities covered by the social sector survey with regard to these services. This section presents households' views on their access

to and usage of water and sanitation services and discusses the availability of drinking water, proper garbage disposal and toilet facilities.

*Access and Sources of Safe Drinking Water*

Pure and clean drinking water is critical in reducing water-borne diseases such as cholera, typhoid, diarrhea and dysentery, all of which as indicated above, account for 25% of the prevalent sicknesses in the communities. When asked about their primary source of drinking water, 2.9% of households reported access to pipe borne water (mainly gravity water supply), 9.4% said they get water from wells fitted with hand-pumps and a majority 71.2% get water from wells without hand-pumps (traditional wells), and about 8% of respondents reported obtaining their drinking water from the streams and/or rivers around their villages (refer to table 6.17).

**Table 6.17: Sources of Drinking Water**

| Source of Water | Frequency | Percent (%) |
|---|---|---|
| Pipe borne water | 5 | 2.9 |
| Ordinary well | 28 | 16.5 |
| Hand pump well | 16 | 9.4 |
| Stream/river | 121 | 71.2 |
| **Total** | **170** | **100.0** |

*Time Spent to Access Sources of Drinking Water*

The time households spend to reach the source of water and its proximity are significant factors influencing people's access to the supply of drinking water. It is well known that children and women particularly in rural settings are often responsible for fetching water. Therefore, when the distance to the source of water is far, a lot of time is wasted, and this negatively affects the time available for women to attend to other chores. Children on the other hand are not able to go to school on time and when they manage to go, are very tired and this affects their output in school.

Results from the study reveal that 40.5% of the households surveyed spend less than 15 minutes to get to their closest water source, as is indicated by table 3.33. Approximately 32.4% spend between 15 and 30 minutes, 26.5% spend over 30 minutes to an hour while only 0.6% spends between 1 and 2 hours to access water.

**Table 6.17: Time Spent by Household Members to Access Drinking Water**

| Time Spent | Frequency | Percent (%) |
|---|---|---|
| Less than 15 minutes | 69 | 40.5 |
| 15 to 30 min | 55 | 32.4 |
| 30 min to 1 hour | 45 | 26.5 |
| 1 hour to 2 hours | 1 | 0.6 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

*Disposal of Refuse*

Unregulated garbage disposal results in high incidences of diseases such as malaria, cholera and diarrhoea, which cause many deaths. Households were asked to reveal where they dispose of their garbage. Table 3.33 shows that a majority of about 88.8% dispose in the bush, 4.6% burn their refuse, 2.4% throw in the stream, 2.4% use public litter while only 1.8% decompose their refuse for agricultural purpose.

**Table 6.18: Refuse Disposal Methods**

| Refuse Disposal Methods | Frequency | Percent (%) |
|---|---|---|
| Burn | 6 | 4.6 |
| Throw in the bush | 151 | 88.8 |
| Throw in the stream | 4 | 2.4 |
| Public litter bin | 4 | 2.4 |
| Decompose for agricultural use | 3 | 1.8 |
| **Total** | **170** | **100.0** |

The common means of refuse disposal in the study area are not safe. Refuse dumped on uncovered or unprotected sites could serve as breeding grounds for disease organisms.

*Excretal Facilities and Disposal*

There are several means of excreta disposal in these communities, most of which are traditional pit latrines. Streams and the bush also serve as excreta disposal means; these means are unhygienic and therefore may lead to health related problems such as diarrhea.

Poor and inadequate toilet facilities are prevalent problems in the communities covered by the survey. The survey revealed that about 67.1% of respondents use ordinary pit latrines, approximately 23.5% go to the bush, 5.9% use ventilated and improved pit (VIP) latrines, and only about 3.5% (all from Mange Mori) use flush toilets (refer to table 6.19). The use of flush toilets is therefore uncommon and ordinary pit latrines were the most common response in all the localities covered.

**Table 6.19: Excretal Disposal Facilities**

| Types of Toilet Facility | Frequency | Percent (%) |
|---|---|---|
| Flush toilet | 6 | 3.5 |
| Traditional pit latrine | 114 | 67.1 |
| Ventilated improved pit (VIP) | 10 | 5.9 |
| Bush | 40 | 23.5 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

*Social and Economic Facilities*

Court houses (locally known as court barries) are evident in almost all the settlements but some of them are privately owned. At Mange the chiefdom speaker owns a court house which is built very close to his residence. There are few court houses that were built for some communities. The court house at Mange was built by National Commission for Social Action (NaCSA).

Mange and Kagbantama are the only settlement with markets. Two market places were constructed by National Commission for Social Action (NaCSA). In all the other settlements, wares are sold in the verandahs of houses or are peddled around by vendors.

*Plantation Ownership, Acquisition and Source of Capital*

Household respondents were asked to state if they own oil palm plantation, method of acquisition and source of capital. In running the percentage frequency of the first three crops cultivated and traded by community people, oil palm tops the priority list with 58%.

*Plantation Ownership*

The importance attached to oil palm production in the communities covered by the survey is further reflected in the high percentage of respondents owning oil palm plantations. Of the total number of respondents interviewed, the survey data (Table 6.20) shows that 67.6% reported that they own an oil palm plantation as against only 32.4% who do not own any.

**Table 6.20: Ownership of Oil Palm Plantation**

| Do you own an oil Palm Plantation | Frequency | Percent |
|---|---|---|
| Yes | 115 | 67.6 |
| No | 55 | 32.4 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

Of those who own oil palm, 63.5% planted it themselves and 31.8% inherited in from deceased relatives, 1.8% claimed plantation was bestowed by family members while 3.0% acquired through collateral (refer to Table 3.36 below). This is a good indicator for a big investment for plantation owners. However, none of the respondents reported to have bought his/her oil palm plantation.

**Table 6.21: Method of Plantation Acquisition**

| Method of Plantation Acquisition | Frequency | Percent (%) |
|---|---|---|
| Planted by myself | 108 | 63.5 |
| Inherited from relatives | 54 | 31.8 |
| Besowed by family members | 3 | 1.8 |
| Acquired through collateral | 5 | 3.0 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

*Micro-credit Facility*

Financial support is a major factor for business growth. There is huge absence of financial support for businesses generally and oil palm farmers. As shown in the table 3.37, there is virtually no

formal source of pre-financing for plantation growers. Approximately 57% of the respondents reported that they depend on loans from individuals (friends and family members) and about 38% take loans from those who buy their produce. All other sources of pre-financing account for less than 10% and banking source is not a source of loan for most of the smallholders.

**Table 6.22: Source of Plantation Finance**

| Source of Finance | Frequency | Percent | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| Bank loan | 170 | 0.6 | 99.4 | **100.0** |
| Micro credit | 170 | 1.2 | 98.8 | **100.0** |
| Loan from individual | 170 | 3.5 | 96.5 | **100.0** |
| Loan from business association | 170 | 1.2 | 98.8 | **100.0** |
| Assistance from NGOs | 170 | 4.1 | 95.9 | **100.0** |
| Loan from produce buyers | 170 | 29.4 | 70.6 | **100.0** |

*Source: Survey Data*

A good number of the respondents are willing to take micro-credit if available, in order to improve some aspects of their business as their dire need for pre-financing or credit facility availability is a good entry ground for any big company wanting to invest into oil palm production.

### *6.4.6.19 Respondents' Perceptions about Rewilding Maforki Project*

The success of any company in a community depends on the acceptability of the project by the community and the cordial relation that will exist between both parties. The survey investigated if the community members are aware of the company's existence and its intension and their feelings towards the company project, 93.5% of the respondents indicated that they feel good, 4.7% feels bad while only 1.8% indicated that they feel indifferent.

**Table 6.23: Perception about Proposed Project**

| Perception | Frequency | Percent |
|---|---|---|
| Good | 159 | 93.5 |
| Bad | 8 | 4.7 |
| Indifferent | 3 | 1.8 |
| **Total** | **170** | **100.0** |

*Source: Survey Data*

When asked reasons for feeling good, the following were their responses:

- Create employment facility;
- The company will likely construct dwelling houses for their workers;
- Company will likely help construct health facilities;
- Land compensation will be paid;
- The presence of the company will likely reduced poverty
- The company will likely help construct roads;
- Construct hand pump wells;
- There will likely be provision of credit facility; and
- The creation of jobs will lead to the improvement of the standard of living.

For those who are not in favour of the project, the reasons given are stated as follows:

- The will be accommodation problem because of the influx;
- The influx will also lead to decrease in the wage;
- There will be human right abuse; and
- There will be reduction in farm land because of the size of the company's project.

In addressing the constraints and impacts envisaged the following are the recommendation proposed by the people:

- The company can help with give credit facilities;
- Farmers be assisted with tools for cultivation;
- Provision of improved seeds;
- Training should be provided for indigenes;
- Provision of good drinking water source; and
- Construction of feeder roads.

*6* .5 STAKEHOLDER CONSULTATIONS

REWILDING MAFORKI recognizes the need to consult local and institutional stakeholders about its reforestation project in the reserve. In trying to get a deeper understanding of the key stakeholder issues, the company and its consultants engaged in discussions and interactions with key local and institutional stakeholders. A consultation schedule and key observations for each stakeholder are outlined below:

**FGDs**

The consultant conducted a total of 5 FGDs in the Five Chiefdoms making up the study area. Each FGD comprised of 30 participants to permit well-focused and detailed discussions. Furthermore, the consultant made sure that each FGD discussion is open, participatory, and flexible. (Table 6.24 below)

| Table 1: Qualitative Data Collection – FGD Matrix | | | | | | | |
|---|---|---|---|---|---|---|---|
| Chiefdoms | Land-owing Families/ Land owners committees | Youth Group members | Adult Community Members | Women groups rep | Chiefdom / Traditional Stakeholders (Section and town chiefs and head men's) | Affected community people | Total |
| Bureh | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| Kasseh | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| Maconteh | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| Bakehloko | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| Kamasondo | 5 | 5 | 5 | 5 | 5 | 5 | 30 |
| | | | | | **FGD Total** | | **150** |

The following Categories of persons will be targeted for interview as presented on Table 6.25 below.

| No. | Category of Persons |
|---|---|
| 1 | Affected Land-owing Families |
| 2 | Land Owners Committee |
| 3 | Youth Group members |
| 4 | Organization/Union (Women) |
| 5 | Adult community members |
| 6 | Physically Challenged persons |
| 7 | Section Chiefs and town chiefs |
| 8 | Traditional stakeholders |
| 9 | Women groups reps |

**Key Informant Interview**

**Rewilding Maforki Assessment: List of organisations and MDAs for Key Informant interviews**

Table: 6.26 below

| Organization/MDA | Number of Informants | Location | Mode of Interview |
|---|---|---|---|
| Ministry of Agriculture (Port Loko) – Forestry, Crops & District Agriculture Officer) | 3 | Port Loko | In person (face to face) |
| Development and Planning Officer (Port Loko District Council) | 1 | Port Loko | In person (face to face) |
| Ministry of Lands | 1 | Port Loko | In person (face to face) |

| | | | |
|---|---|---|---|
| NAMATI | 2 | Port Loko | In Person (Face to face) |
| Chief Administrator (Port Loko District Council) | 1 | Port Loko | In Person (Face to face) |
| Environment and Social Officer (Port Loko District Council) | 1 | Port Loko | Zoom |
| Ministry of Social Welfare | 1 | Port Loko | In Person (Face to face) |
| Environmental Protection Agency | 1 | Freetown | In Person (Face to face) |
| Civil Society Organisations / Community Based Organisations | 5 | Port Loko District | In Person (Face to face) |
| | | | |
| Paramount chiefs | 5 | Freetown/Provinces | Zoom/ In person (face to face) / Telephone call |
| Section Chiefs / Traditional authorities | 2 | Provinces | In Person (Face to face) |
| Chiefdom level councillors | 6 | Provinces | In Person (Face to face) |
| Member of Parliament | 3 | Provinces / Parliament | In person (face to face) / Telephone call |
| **Total** | **32** | | |

A maximum of 32 Key Informant Interviews with stakeholders are conducted as provided above.

3. Field Schedule for stakeholder's engagement.

**Table 6.27**

| N0. | Activity | Date | Responsible persons |
|---|---|---|---|
| | FGDs | | |
| 1 | Bureh | 28th – 31st January 2023 | Mohamed Mansaray |
| 2 | Kasseh | 28th – 31st January 2023 | Mohamed Mansaray |
| 3 | Maconteh | 28th – 31st January 2023 | Mohamed Mansaray |

| | | | |
|---|---|---|---|
| 4 | Bakehloko | 28th – 31st January 2023 | Mohamed Mansaray |
| 5 | Kamasondo | 28th – 31st January 2023 | Mohamed Mansaray / Ecoworld |
| | KII | | |
| | Ministry of Agriculture (Port Loko) – Forestry, Crops & District Agriculture Officer) | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Development and Planning Officer (Port Loko District Council) | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Ministry of Lands | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | NAMATI | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Chief Administrator (Port Loko District Council) | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Environment and Social Officer (Port Loko District Council) | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Ministry of Social Welfare | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Environmental Protection Agency | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Civil Society Organisations / Community Based Organisations | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Paramount chiefs | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Section Chiefs / Traditional authorities | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Chiefdom level councillors | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |
| | Member of Parliament | 27th - 31st January, 2023 | Mohamed Mansaray / Ecoworld |

**Interests and Concerns of the Traditional Council**

- Effective monitoring and management of the plantation is required to reduce the damaging effects of illegal settler farmers to establish farms and cattle grazing. This has been the source of many major forest fires in the area. It was suggested that the company would employ more staff to monitor the plantation.

- Employment is a key issue in the area and it was suggested that REWILDING MAFORKI should provide jobs for the well-being of young people in the area.

- Revenue earning streams from forest outputs for landowners has virtually ceased to exist. The general viewpoint is any reforestation project that can generate financial returns to the community is highly desirable.

- Financial support has been required by the Traditional Council for the development of a vocational training center.

- Would like to have scholarships and educational grants for deserving students to achieve a tertiary level of study in Agro-forestry related disciplines.

- The company must ensure they protect their society bushes.

**Interests and Concerns of Squatter Farmers and Herdsmen Representatives**

- The grazing of cattle in the area has been a major source of local discontent as this has resulted in damage to crops by cattle. It was suggested that a means for cattle to be identified in the area should be introduced; as cattle owners refused to accept liability for herd damage to food crops.
- It was noted that the farmers (local and migrant) made requests to allow farming to coexist alongside the establishment of plantations as this was an important food source for the community.
- It was also noted that the farmers acknowledged their illegal entry into the project site stating that this was not intentional; but due to the fact that some land owners had collected monies from the farmers and illegally allocated portions of the reserve lands to them.

**Interests and Concerns of Forestry Services Division (FSD)**

- FSD supports reforestation projects and promised to make seedlings available to the company.
- The FSD also promised to share their expertise with the company workers
- The management and control of fire is a major concern for this stakeholder due to the spate of bush fires that occur in these areas.
- Request the company to employ forest guides to minimize or avoid encroachments.
- Proper land negotiation should be done with land owners.

**Interests and Concerns of Wildlife Division**

- This stakeholder was principally concerned about the impact of agrochemicals and spent oils discharged on fauna through possible poor control, use and disposal of such chemicals.
- Concern was also raised about the possible poaching of game by local communities and workers of REWILDING MAFORKI.
- It was also noted that the spread of uncontrolled farm fires started by farmers had the tendency to spread. Coupled with their lack of fire fighting equipment, these farmers are unable to bring the fires under control and consequently these fires spread uncontrollably and result in serious damage to wildlife and their habitats.
- Damming of water courses for irrigation can lead to flooding and also affect the biodiversity and water accessibility of the areas in which they exist. It was noted that this form of practice is highly undesirable and hoped that REWILDING MAFORKI will not engage in this practice.

**Interests and Concerns of the Water Resources Commission**

- The Commission welcomed the planting of trees in these areas as this would be highly beneficial to the environment and local stakeholders.
- Establishment of Buffer and Riparian Strips is of major importance to this stakeholder; and should form a key part of REWILDING MAFORKI operations. Buffers and riparian strips serve to support and maintain biodiversity in these areas. It was noted that the Commission recommended that REWILDING MAFORKI pay attention to the Riparian Buffer Zone to Manage Freshwater Bodies because of the proximity of rivers and seasonal streams traversing the reserve.
- The WRC stated that there should be controlled use of water systems in the plantation and that water sources from rivers and boreholes should be monitored on a regular basis.
- As a regulator, the WRC wishes to ensure that all necessary permits must be obtained to ensure compliance with their Act.
- The WRC also expressed concern about the use of uncontrolled chemicals by farmers in and outside the plantation; as this could result in damage to aquatic life and biodiversity sensitive areas.

**Interests of the Port Loko District Council**

- The Council's principal desire is to see more locals being employed by REWILDING MAFORKI.
- The Chairman emphasized on the land acquisition to be done in line with the laws of the country.

- The Environment Officer of the Council requested the company to engaged their department as they would help to build the capacity of the workers.
- The Council also indicated its interest to be involved in stakeholder groups and thus contribute to sharing of information and to identify areas for future collaboration.
- The Development Officer requested the company to develop their CDAP in line with the development plans of the District.
- The company should register with the council before undertaking their project activities

**Interests of the Ministry of Social Welfare**

- The main concern of the ministry is the impacts on the aged and physically challenged persons.
- Job opportunities should be given to locals.
- Support should be given to farmer's groups.
- Land negotiation should be done in line with the local laws of the land.

**Key concerns from the focus group discussions**

- Proper land negotiation should be done and Land owners be paid accordingly
- The company should construct its offices to build the confidence of the locals
- The lands taken for the company project were used for farming and wood collection for sale. Mostly women were engaged on these activities. Alternative livelihoods like skills training, recycle loan schemes, provision of seed inputs and farming tools, scholarships for their children and job employment should be provided.
- Community requested for feeder roads rehabilitation, construction of water wells, provision of teaching and learning materials, construction of a senior secondary school, rehabilitation of community mosques, construction of a health center and community center.
- Employment should be prioritized in the company areas of operations.
- On job training should be provided for community youths.
- Surface rent payments should be made on time.
- The community stakeholders in Kamasondo and Bakeloh Chiefdoms are happy about the project but most of them informed the team that this is the very first time they are hearing about the project and that no proper land arrangement or site survey has been done. They called on the company to further engage them as other companies are in talks with them to lease their lands for other agricultural activities.

## PICTURES OF STAKEHOLDERS ENGAGEMENTS

Meeting with the Port Loko District Agriculture Officer and the Crops Officer of the Ministry of Agriculture and Forestry

Meeting with the Ministry of Labour and the Ministry of Social Welfare

Meeting with the community Stakeholders of Kasseh

Meeting with the community stakeholders of Maconteh

Meeting with the Chairman, ESO and the Chief Administrator of the Port Loko District Council

Meeting with the District Agriculture Officer

**Engagement with the District Forestry Officer (Mr. Patrick Abu Mattia)**

CHAPTER 7: IMPACT ASSESSMENT AND MITIGATION

Methodology for Impact Assessment and Predictions

This chapter provides an overview of the type of environmental related issues examined in more detail during the Impact Assessment phase of the ESIA. The consultants have evaluated all potential impacts on the environment in six stages to determine the significance of each impact:

**Stage 1 – Description of the nature of the impact**

This evaluates whether the project impact is beneficial or not. It also determines the project consequences on the environment and its severity as well as its effect on stakeholder interests. A beneficial impact is assigned positive (+ve) value because it does not have an adverse effect on the environment and/or stakeholders. A negative (-ve) value indicates an adverse effect.

The impact description rating table below is allocated the highest point scores range of -8 to 8 because of the different possibilities of impact - negative/positive, direct/indirect and reversible/irreversible.

*a)* Positive/Negative *(beneficial or adverse)*
*b)* Direct/Indirect (*directly or via intermediate factors that influences the determinants of an impact).*
*c)* Reversible/Irreversible (*is the impact reversible or not)*

| **IMPACT DESCRIPTION** | | | |
|---|---|---|---|
| **Negative Impact Rating** | | **Positive Impact Rating** | |
| **Negative impacts** | Points (-ve) | **Positive impacts** | Points (+ve) |
| Negative, direct, irreversible | -8 | Positive, direct, irreversible | 8 |
| Negative, indirect, irreversible | -6 | Positive, indirect, irreversible | 6 |
| Negative, direct, reversible | -4 | Positive, direct, reversible | 4 |
| Negative, Indirect, reversible | -2 | Positive, Indirect, reversible | 2 |

**Stage 2 – Description of Magnitude of impact**

This is a measure of the scale of the impact of the project activities: *i.e Does the impact occur at a national, regional, local or project site level?*

| MAGNITUDE | Adverse | Beneficial |
|---|---|---|
| **Scale of Impact** | **Points** | **Points** |
| National | -4 | 4 |
| Regional | -3 | 3 |
| Local | -2 | 2 |
| Site only | -1 | 1 |

**Stage 3 – Duration of Impact**

Duration refers to the length of time over which the environmental impact may occur:

| DURATION | Adverse | Beneficial |
|---|---|---|
| **Impact Duration** | **Points** | **Points** |
| Long term/Permanent (over 10yrs) | -4 | 4 |
| Medium term (5-10 years) | -3 | 3 |
| Short term (0-5 years) | -2 | 2 |

**Stage 4 – Potential Consequences**

This is the actual result and scale that an impact might have. The potential consequence of an impact depends on the magnitude of the potential changes to the environment caused by an activity and the level of sensitivity of the recipient environment and or stakeholder groups. These are depicted below.

**Extreme** – *An effect resulting in serious and irreversible degradation/destruction of the environment and/or results in major health conditions (HIV, hepatitis, malaria, etc) or has a major negative impact on the well being of the local populace and/or stakeholders.*

**Great** – *An effect that is usually irreversible resulting in a positive impact or negative consequence on the environment (soils, water systems, vegetation, topography etc) and/or local populace*

**Considerable** – *An effect that may result in major change to the structure and composition of an environmental factor. e.g soil, land topography, diversion and damming of waterways and/or result in a some partial health effects on the local populace.*

**Small** – *These are small impacts or inconveniences that tend to be very temporary with very little effect on the environment or health of workers or the local populace. E.g dust from use of forest roads etc*

**Hardly Any** – *These are mere nuisances not effecting the environment in any significant manner and/or affecting health and welfare of the populace within the project area.*

| POTENTIAL CONSEQUENCES | Adverse | Beneficial |
|---|---|---|
| **Consequence** | **Points** | **Points** |
| Extreme (serious and irreversible) | -4 | 4 |
| Great (Irreversible consequences) | -3 | 3 |
| Considerable (Partial adverse or positive change) | -2 | 2 |
| Small (temporary impacts) | -1 | 1 |
| Hardly any (mere nuisances with little or no significant impacts) | 0 | 0 |

**Stage 5 – Likelihood of occurrence/probability**

This is an assessment of the probability of the impact occurring. It is used as a multiplication factor because it influences the degree of significance of the impact.

| PROBABILITY | |
|---|---|
| **Likelihood of Occurrence** | **Points** |
| High (80-100%) | 5 |
| Medium High (60-80%) | 4 |
| Medium (40-60%) | 3 |
| Medium Low (20-40%) | 2 |
| Low (<20%) | 1 |

**Stage 6 – Severity/Degree of significance**

The final stage of the assessment looks to determine the significance of the impact as a result of previous five stages of assessment by rating significant adverse and significant beneficial effects. The degree of significance (Dsig) of the impact is rated by using the following formula:

**Dsig = (Id + Mg + Dr + Pc) x Pr**

Where, Id is the Impact Description, Mg is the Magnitude, Dr is the Duration, Pc is the Potential Consequences and Pr is the Probability of occurrence. The degree of significance ratings for both adverse and beneficial effects is listed in the table below.

**Degree of Significance Classifications**

| **Negative Impacts** | | |
|---|---|---|
| Significance | Points | |
| Severe | > -75 | An impact which could influence the decision about whether or not to proceed with the project |
| Major | -51 to -75 | An impact which could influence the decision if mitigation is adopted |
| Moderate | -26 to -50 | Impact could influence the decisions about the project if left unmanaged |
| Minor | -10 to -25 | Impact that has very little effect on modification of the project design |
| Negligible | < -10 | Adverse impact which may be ignored in deciding to implement project |
| | | |
| **Positive Impacts** | | |
| Significance | Points | |
| Highly Beneficial | >75 | Beneficial impact which strengthens decision to proceed with the project and with no modification of project design |
| Major | 51 to 75 | Beneficial impact which strengthens decision to proceed with project with minor modifications to project design |
| Moderate | 26 to 50 | Beneficial impact strengthens decisions to proceed with project with few modifications of project design |
| Minor | 10 to 25 | Beneficial Impact that needs to be taken into account in overall decision making to implement project |
| Negligible | < 10 | Beneficial Impact which may be ignored in deciding to implement project |

Key Project Activities

The key activities for the Rewilding Maforki project are as follows:

1. Nursery Establishment
2. Landscape Planning

3. Creation of Special Management Zones (*Cliff edges and Rocky outcrops, wetland and riparian strips, archaeological/cultural sites, indigenous species and forests, conservation areas)*

4. Site and Tree Species matching

5. Road Construction and Maintenance

6. Land Clearing and Preparation

7. Soil Preparation

8. Slash Management

9. Planting of Trees

10. Weed Control

11. Thinning and Maintenance

12. Harvesting and Felling

13. Forest Fire Management

14. Labour and Staff recruitment

The environmental sensitivities likely to be affected by the proposed development activities have been identified by evaluating the impact of **each** REWILDING MAFORKI project activity on **various** environmental and social economic conditions. This is because each key REWILDING MAFORKI activity is likely to impact a number of environmental/social factors. The key REWILDING MAFORKI activities and their respective likely impacts are listed below; and subsequently each is described.

Key Project Activities and Likely Impacts

**Nursery**

- Impact on groundwater

**Landscape Planning**

- Impact on Land use
- Impact on harvesting plans and landscape visual aesthetics
- Impact of poorly managed slash on landscape

**Creation of Special Management Zones** (*Cliff edges and Rocky outcrops, wetland and riparian strips, archaeological/cultural sites, indigenous species and forests, conservation areas)*

- Impact on Protection of biodiversity rich and unique habitats
- Impact on Protection of indigenous natural forest species
- Impact on Reduction of wetland water levels by trees with high water absorption rates
- Impact on Protection of cultural and archaeological sites

**Site and Species matching**

- Impact on Soil nutrients
- Impact on changes to soil physical properties
- Impact on micro-climate conditions
- Impact of colonization by invasive species
- Impact on food sources for fauna

**Road construction and maintenance**

- Impact on soil erosion
- Impact on surface run off
- Impact on impoundment of streams
- Impact on quality of water bodies
- Impact on noise pollution
- Impact on air quality
- Impact on vegetation
- Impact on access to plantation

**Land Clearing**

- Impact on vegetation and canopy cover
- Impact on fauna habitats
- Impact on biodiversity
- Impact on soil erosion
- Impact on recharge of aquifers
- Impact on soil nutrients
- Impact of material transport into water-bodies
- Impact on illegal plantain and maize farms
- Impact on livelihoods of illegal and migrant farmers

**Soil Preparation**

- Impact on Soil nutrient enhancement/degradation from use of chemicals
- Impact on Soil erosion
- Impact of sedimentation on nearby water bodies

**Slash Management**

- Impact of Slow release of nutrients into soils
- Impact on soil moisture
- Impact of smoke inhalation by workers and surrounding settlements
- Impact on fire ignition and spread
- Impact on Soils

**Planting of trees**

- Impact on the development of micro climates
- Impact on alteration of reserve landscape
- Impact on employment and sub-contracting of farmers
- Impact on Inter-cropping by local farmers

**Use of agro-chemicals**

- Impact on soils, water bodies and aquatic life
- Impact on eutrophication
- Impact on health and safety of workers
- Impact on wildlife population

**Thinning and Maintenance of Tree Stands**

- Impact of fire risk from dry fuel matter
- Impact on soil compaction and erosion
- Impact on sedimentation run-off into water bodies

**Harvesting and Felling**

- Impact on corridors used by fauna
- Impact on flora
- Impact on soil compaction and erosion
- Impact of noise from harvesting machinery
- Impact of dispersal of dust from use of roads
- Impact on landscape aesthetics

- Impact of increased fire risk from dry fuel matter (twigs, leaves, branches, bark etc)

**Forest Fire Management**

- Protection of potential stakeholder revenues from forest outputs
- Protection of worker's livelihoods
- Health of the local communities
- Support regeneration of the reserve
- Protection of wildlife habitats and fauna

**Establishment of Sawmill and Treatment Plant**

- Impact on employment
- Impact on skills development and training
- Development of support industries and services
- Impact from economic migration of people from outside project area seeking jobs, housing and social amenities

**Labour and Staff recruitment**

- Impact on employment
- Impact on income generation for workers
- Impact on gender balance in employment

**Stool Stakeholder Interests**

- Monitoring and Management of the Reserve
- Revenue earning streams from forest outputs for stool landowners
- Distribution of financial benefits amongst 3 stool land owners
- Employment and well being of young people
- Training and skills development of local populace
- Development of a vocational training centre
- Poverty alleviation
- Health and welfare

**Squatter Farmers and Herdsmen Interests**

- Farming and Cattle Grazing
- Permission for Inter-cropping on reserve lands

**Forestry Services Division**

- Reforestation of the reserve to meet landowner and local aspirations.
- Management and Monitoring of the forestry plantation.
- Uncontrolled spread of illegal settlers entering the plantation.
- Management and Control of Fire

**Wildlife Division of Forestry Commission**

- Spread of Uncontrolled Farm Fires
- Impact of Agrochemicals and Spent Oils Discharged on Fauna

**Water Resources Commission**

- Establishment of Buffer and Riparian Strips
- Controlled Use of Chemicals and Monitoring
- Controlled Use of Water Systems
- Surface and Underground Water Pollution
- Underground Water Re-charge

**Port Loko District Council**

- Creating Employment Opportunities
- Integration with regional and local development plans.

Description of Potential Impacts from the REWILDING MAFORKI Proposed Project Activities

Establishment of a Nursery

### 7.4.1 Impact on Groundwater and Rivers

The nursery requires approximately 50,000 litres a day (0.5litres/second of groundwater extraction) at peak production. According to Water Use Regulations of the National Water Resource Agency Act of Sierra Leone, groundwater extraction less than 5litres/sec requires Rewilding Maforki to register its use of a borehole with the Water Resources Commission.

***The impact of the nursery activity on groundwater is rated as negative, direct, reversible, site only and short term; the potential consequence is small; with probability of the impact occurring rated as medium low (20-40%). The degree of significance of the impact is therefore rated as Minor.***

| *Use of Groundwater and Rivers* | *Points* |
|---|---|
| **Impact Description (Id)** | **-4** |
| **Magnitude (Mg)** | **-1** |
| **Duration (Dr)** | **-2** |
| **Potential Consequences (Pc)** | **-1** |
| **Probability of Occurrence (Pr)** | **2** |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***-16*** |
| ***Overall Adverse Impact Rating*** | ***Minor*** |

Landscape Planning

**Impact on Land Use**

Rewilding Maforki project has the potential to affect land use patterns in the areas of operations. The area is severely degraded; with little remnants of the old forest remaining. Currently, land use patterns are primarily limited to agriculture and cattle grazing activities by farmers.

***The impact of landscape planning on land use is therefore positive, direct and irreversible, local, permanent. The probability of this impact occurring is rated as medium high (60-80%) with a potential consequence rating of great. Generally, the degree of significance of the impact on land use is therefore rated as Highly Beneficial.***

| *General Land Use* | *Points* |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***85*** |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Impact on Harvesting and Slash Management**

Every landscape has a distinctive character. Any agro-forestry activity placed in that landscape will contrast or blend with the character of the landscape, and REWILDING MAFORKI aims to manipulate these variables for positive and harmonious landscape effect.

Poor landscape planning and harvesting can have a detrimental effect on the project area. The project area is already seriously degraded. The virtual absence of trees in the open degraded landscape is such that in its current form, the reserve is subject to wild fires fueled by the lack of trees to act as wind breaks and provide moisture in tree undergrowth and below tree canopies. If the present openness of the site is allowed to remain, then increased winds are likely to be encountered within the areas. In the event of any fires, these winds will fuel fire spread, resulting in increased smoke generation and the attendant consequences of lowering the air quality and risks to the health of the local surrounding populace. Similarly, poorly managed slash (*debris of small leaves, twigs and branches)* from harvesting operations can contribute to negative perceptions and should therefore be avoided at all costs. Slash can also be a source of fire ignition and fire spread.

***The impact is rated as positive, direct, reversible, local and long term. The potential consequences are rated as considerable and probability of the impact occurring is high (80-100%). The degree of significance of impact is rated as Major.***

| ***Harvesting and Slash Management*** | ***Points*** |
|---|---|
| Impact Description (Id) | 4 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 3 |
| Potential Consequences (Pc) | 2 |
| Probability of Occurrence (Pr) | 5 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***55*** |
| ***Overall Positive Impact Rating*** | ***Major Benefits*** |

Management of Special Zones (Cliff edges, Rocky outcrops, wetlands and riparian strips, archaeological/cultural sites, indigenous species, conservation areas)

**Protection of rich biodiversity habitats**

Some of the project areas contain high biodiversity habitats which need to be protected. These include habitats for snakes, grass-cutter, lizards, ants and some birds. In the absence of proper management of biodiversity habitats, there is a danger that such habitats are ignored and/or poorly managed or damaged. Currently, there are no known management interventions and visible physical buffers to protect these habitats. This leaves them open to damage and exploitation by locals. The proposed REWILDING MAFORKI development intends to zone off these areas by

creating a buffer 30 metres from the occurrence of such outcrops and to facilitate the management and protection of these outcrop areas. These zones will not be subject to any tree planting activity.

***The impact is rated as positive, direct and irreversible, with a site only scale of impact and of permanent duration. The potential consequences are great and the probability of the impact occurring is medium high (60-80%). The degree of significance is rated as having Major Benefits.***

| ***Protection of rich biodiversity habitats*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 1 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 4 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***64*** |
| ***Overall Positive Impact Rating*** | ***Major Benefit*** |

**Protection of indigenous natural forest tree species**

Most of the indigenous trees have been extracted by commercial logging or destroyed by the forest fires. This has contributed to the degraded state of the reserve. However, field surveys have revealed small pockets of indigenous trees dotted all over the reserve and within REWILDING MAFORKI allocated compartments. REWILDING MAFORKI proposes not to touch these and other indigenous tree species as they provide habitats for a variety of fauna and play a major role in maintaining and restoring the character of the reserve. Where these trees occur in large clusters, it is proposed to create conservation zones. In addition, REWILDING MAFORKI proposes to re-introduce some of these indigenous species to assist in restoring some of the natural characteristics of the project areas.

***The impact is rated as positive, direct and irreversible; local and permanent in duration. The potential consequences of such an impact are rated as small. The probability of this impact occurring is high (80-100%).The degree of significance is rated as being Highly Beneficial.***

| ***Protection of Indigenous Tree Species*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |

| | |
|---|---|
| Potential Consequences (Pc) | 2 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | ***80*** |
| ***Overall Impact Rating*** | ***Highly Beneficial*** |

**Wetlands and Riparian strips**

Wetlands and riparian strips are sensitive areas because of their proximity to water bodies, contribution to protection of biodiversity and support of wildlife habitats. REWILDING MAFORKI's operational plans to protect riparian strips meet the guidelines of the Water Resources Commission. However, planting of trees with high evapo-transpiration rates close to wetlands could affect water tables and their contribution to maintaining such wetlands. Various forest expert viewpoints have been expressed on the effect of Eucalyptus trees on hydrology:

"*Eucalyptus plantations in several countries have been the subject of criticism because of their high water use and other negative environmental impacts. Examination of the evidence for these claims has usually concluded that well-managed plantations are beneficial rather than detrimental to the environment"(Poore and Fries 1985, White et al. 1995, Casson 1997).*

***This impact is rated as negative, direct and reversible, local with long term duration. The potential consequence is rated as considerable with the probability of the impact occurring rated as medium (40-60%). The degree of significance is rated as moderate.***

| ***Wetlands and Riparian Strips*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***-36*** |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Protection of archaeological and cultural sites**

Following the scoping assessment and field surveys conducted as part of the main assessment, no archaeological or cultural sites have yet been located in any of the REWILDING MAFORKI

allocated compartments. It is however noted that some shrines do exist outside the project areas. In the event that such sites are later found, REWILDING MAFORKI proposes to create a 5m exclusion buffer zone around such sites. If it is determined that tree planting operations will affect such sites, provision is made in REWILDING MAFORKI operational plans to increase the buffer distance accordingly.

***This potential impact is described as positive, direct and irreversible, local and permanent. The potential consequence is described as small. The probability of the impact occurring is rated as medium high (60-80%).The degree of significance of the impact is therefore rated as being a major benefit.***

| ***Protection of archaeological and cultural sites*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 2 |
| Probability of Occurrence (Pr) | 4 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***64*** |
| ***Overall Positive Impact Rating*** | ***Major Benefit*** |

Site and Species Matching

**Soil Nutrients**

Soil nutrient is indicated by the chemical properties of the soil. Following soil testing, the chemical properties indicate general low levels of soil nutrients, especially organic matter, nitrogen, calcium, magnesium and potassium. Most often top soils serve as the nutrient reservoir; holding and releasing nutrients into the soils. In the project areas where the topsoil (0-20cm) indicates low nutrient status, this may be explained by a number of factors such as:

a. Continuous cropping by farmers mining the soil of nutrients without replenishment and
b. The loss of nutrients of the top soils through erosion and leaching

With the soils already depleted of nutrients, implementing the project without embarking on soil nutrient improvement measures will result in aggravating the current nutrient status. However, the pH levels and general soil conditions are suitable for this project; albeit some compartments may need some soil enrichment activities to promote better tree growth.

***The potential impact is rated as negative, direct, reversible; local, short term with considerable potential consequences. The probability of occurrence is medium high (6080%). The degree of significance of the impact is therefore rated as moderate.***

| ***Site and Species matching on soil nutrients*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 4 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***- 40*** |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Changes to Soil properties**

Soil depth, structure and drainage are essential soil physical properties for tree growth. With the development of the project, conditions may be created to affect the above mentioned physical properties of the soil. Soil depth can be improved by the micro-climate conditions that would be created by the established trees to promote weathering and decomposition of regolith material. Biomass falling to the ground would decompose to improve on soil structure. By planting in poorly drained sites, the species will improve on the drainage conditions of such sites.

***The impact of Site and Species matching on the soil properties is rated as positive, direct, reversible, local and permanent. Potential consequences are great with the probability of occurrence rated as high (80-100%). The degree of significance is therefore rated as major.***

| ***Site and Species matching on soil properties*** | ***Points*** |
|---|---|
| Impact Description (Id) | 4 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***65*** |
| ***Overall Positive Impact Rating*** | ***Major*** |

**Colonization by invasive species site species**

Some plant species introduced as exotics for forest plantation activities have the tendency to produce prolific natural regeneration when they start producing seeds. These seeds can be dispersed by air and birds into other areas in the community. This may result in a negative and undesired spread and colonization by such species. It is therefore always difficult and expensive to eliminate invasive species. However, the species to be planted by REWILDING MAFORKI are not known to have such prolific natural regeneration.

***The impact by invasive species is rated as negative, indirect and irreversible. Its magnitude is local. The duration is deemed to be long term and the potential consequences are great. The probability of occurrence is however low (0 – 20%) and the degree of significance of the impact is therefore rated as Minor.***

| ***Colonisation by invasive species*** | ***Points*** |
|---|---|
| Impact Description (Id) | -6 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -3 |
| Probability of Occurrence (Pr) | 1 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-15* |
| ***Overall Negative Impact Rating*** | ***Minor*** |

Road Construction and Maintenance

**Soil erosion**

Access into the project site will have to be created; making road construction and its maintenance a very important component of the proposed project activities. During road construction or maintenance, the topsoil is excavated with the intention of getting to the firm and compacted subsoil to support vehicular movement. The compacted road surface will result in high run-off and eventually induce erosion with potential serious impact on the water quality on any nearby water bodies. During the erosion process, soil particles (topsoil) are removed by run-off and the soil material is transported down slopes and deposited in the lowlands. Rills and gullies may be created as a result of this. The deposited material ending up in streams and rivers result in siltation and consequently facilitate the drying up of water in the channels. Some vegetation and biodiversity would be lost in the process of the road construction. Also surface run-off potential and material transport in water bodies will be high.

***The impact is rated as negative, direct and irreversible. Its magnitude is local and confined to the roads and its immediate environment. The impact is long term and the potential consequences are great. The probability of occurrence is medium high (60 – 80%) and the degree of significance of the impact is therefore rated as Major.***

| ***Soil Erosion from Road Construction and Maintenance*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -3 |
| Probability of Occurrence (Pr) | 4 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-68* |
| ***Overall Negative Impact Rating*** | ***Major*** |

**Surface Run Off**

Road construction is a major cause of surface water run-off which could result in severe erosion if not well managed. The run-off is as a result of surface compaction created by the heavy construction machines. The run-off could cause soil erosion.

***The impact is rated as negative, direct and irreversible. Its magnitude is local and confined to the roads and its immediate environment. The impact is long term and the potential consequences are great. The probability of occurrence is medium high (60–80%); the degree of significance of the impact is major.***

| ***Surface Run Off From Road Construction*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -3 |
| Probability of Occurrence (Pr) | 4 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-68* |
| ***Overall Negative Impact Rating*** | ***Major*** |

**Impoundments of seasonal streams**

Channels of many seasonal streams may be blocked during forest road construction if care is not taken by REWILDING MAFORKI to install culverts or suitable outlets for water flow during rainy season. This can affect the flow into the main rivers and also create local waterlogged situations around the impounded area that may also impact on tree growth and survival. It may also result in the creation of breeding sites for mosquitoes.

***This potential impact is rated as negative, direct, reversible, local and permanent. The potential consequences are considerable with the probability of occurrence rated as medium (40-60%) The degree of significance is therefore rated as moderate.***

| ***Impoundment of seasonal streams from road construction*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-36* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Contamination of water bodies**

The REWILDING MAFORKI project will involve some road construction and maintenance. These activities are likely to result in some forest machinery crossing some temporary and permanent water channels. The turbid water with its suspended soil particles will affect the water quality of streams inside and outside the reserve as the water flows.

***The impact is negative, direct and reversible and local. It is short term and potential consequences are considerable. The probability of occurrence of this impact is high (80100%). This is rated as of moderate degree of significance.***

| ***Contamination of water bodies from road construction*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-45* |

| | |
|---|---|
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Noise pollution**

The REWILDING MAFORKI road and construction activity will inevitably involve the use of forest machinery and power tools. These will generate some minor noise and may result in some minor inconvenience for workers who operate such machinery. As part of its field operations, REWILDING MAFORKI ensures that noise abatement devices such as earphones and earplugs are worn by all operatives who operate machinery. In any event, operations involving forest machinery will be intermittent and very short term and therefore any health related effects from machinery noise are very minimal. From a community perspective, the nearest settlements are typically about 4-5km away from REWILDING MAFORKI allocated compartments. These distances are such that sound and/or noise emanating from forest operations are barely audible**.**

***The impact of the proposed activity on noise is negative, direct and reversible, the scale of the impact is site specific and duration is short term. Potential consequence is rated as small and temporary. The probability of the impact occurring is rated as medium low (20-40%). The degree of significance of the impact is therefore rated as minor***

| ***Noise Pollution from Road Construction*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | 0 |
| Probability of Occurrence (Pr) | 2 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-14* |
| ***Overall Negative Impact Rating*** | ***Minor*** |

**Dust Dispersion**

Dust generation will vary according to the source used to generate the dust and the velocity and frequency at which the source is used. Large scale earth moving equipment such as road graders, caterpillars and tipper trucks used in the construction of roads and are likely to generate more dust than a small tractor plough used to prepare land. The amount of dust generated is directly related to the intensity of use, speed of the equipment and the general compactness of soils; as well as prevailing weather conditions at the time. Dry environments will generate significantly more dust than moist/damp environments. REWILDING MAFORKI activities will generate some temporary levels of dust, albeit in small quantities, when construction is done in the dry season. This will be caused by the use of road construction machinery. The dust generated will be

temporary and the quantities are insufficient to pose any major health risks. REWILDING MAFORKI provides its field workers with dust masks and protective gear as part of its field operations. Road construction will not be an all year round activity and will be carried out in the early stages (1-3yrs) of the project; after which a less intensive road programme is adopted to maintain the roads.

***The impact is rated as negative, direct and reversible, the scale of impact is site specific, and the duration is short term. The potential consequences of the impact are small and probability of the impact occurring is medium (40-60%). The degree of significance is therefore rated as minor.***

| ***Dust Dispersion from Road Construction*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -1 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-24* |
| ***Overall Negative Impact Rating*** | ***Minor*** |

**Clearing of vegetation**

REWILDING MAFORKI proposes to construct some new roads as part of its operations and there will be an inevitable clearing of land vegetation that falls within designated road corridors and their alignment with the topography of the reserve. This will result in displacement of some fauna and flora from their natural habitats; even though most of the fauna in the reserve have migrated as a result of the degraded state of the reserve. Furthermore, the cleared vegetation, if not disposed off properly, can also be a source for fire ignition and fire spread.

***This impact is negative, direct and irreversible. The scale of impact is site specific and duration is permanent. The potential consequences are small and the probability of the impact occurring is rated as medium (40-60%). The degree of significance of the impact is therefore rated as Moderate***

| ***Road Construction on vegetation clearing*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -4 |

| | |
|---|---|
| Potential Consequences (Pc) | -3 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-48* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Unauthorized access to plantation**

The construction of new roads has the potential to open up to illegal and unauthorized access. This can lead to undesirable activities such as illegal establishment of farms, cattle grazing and illegal logging of remnant trees from the old forest being conducted within the area.

***The impact of road construction on access to the reserve is rated as negative, indirect and irreversible. The scale of impact is local, medium term and has a potential consequence rated as considerable. The probability of this impact occurring is rated as medium (40-60%). The degree of significance is therefore rated as moderate***

| ***Road Construction on unauthorised access to the reserve*** | ***Points*** |
|---|---|
| Impact Description (Id) | -6 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -3 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-39* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

Land Clearing

**Clearing of vegetation and flora**

The plantation establishment process by REWILDING MAFORKI will require the complete removal of **some** existing vegetation cover. This leaves clear land surface for land zoning and land planning activities. It also implies that all plant material in the form of trees, shrubs and herbs including grasses will be removed in some areas through slashing, lopping and stumping. This represents a potential loss of representatives of plant species occurring on the cleared site.

***The impact of land clearing on vegetation and flora is rated as negative, direct and irreversible. The impact is site specific, short term and has a potential consequence rated as considerable. The probability of this impact occurring is rated as high (80-100%). The degree of significance is therefore rated as Major.***

| *Land Clearing on loss of vegetation and flora* | *Points* |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -3 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-70* |
| ***Overall Negative Impact Rating*** | ***Major*** |

**Disturbance of wildlife habitats, food and biodiversity**

Even in its degraded form, the trees, shrubs, herbs and grasses in the area form important source of food for the wildlife found in and around the REWILDING MAFORKI sites. Even though most of the wildlife has migrated clearing of the vegetation is likely to limit the diet variability available to the small quantities of wildlife that remain or occasionally visit for food. This disturbance can result in changes to fauna behavior patterns (dwelling, feeding, breeding, daily and seasonal movements etc). The aggregated effects could result in decline in fauna population or permanent absence of species very sensitive to habitat disturbance.

Biodiversity is described in terms of flora and fauna diversity. The reserve is already degraded as a result of over exploitation of trees, widespread fires, illegal farming activities and loss of flora and fauna biodiversity. The land clearing will create unfavorable conditions for the habitats of some micro and macro organisms. The progressive clearing of vegetation across the landscape gradually affects the frequency and distribution of species between cleared and areas not cleared and consequently the biodiversity over time.

***This potential impact is rated as negative, direct and reversible. The magnitude of the impact is deemed to be site specific and of permanent. The potential consequences are small. The probability of the impact occurring is rated as medium (40-60%). The degree of significance of the impact is rated as Moderate.***

| *Land Clearing on wildlife habitats, food and biodiversity* | *Points* |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -1 |

| | |
|---|---|
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-42* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Soil erosion and depletion of soil nutrients**

Soil erosion is inevitable due to the steep slopes and sandy nature of the topsoil. Land clearing will expose the soil to the first few rains which could trigger off erosion. The process of the erosion involves the removal, transportation and deposition of soil material. The topsoil is usually the store-house of soil nutrients and therefore, nutrients are washed away during the erosion process. The soil therefore becomes impoverished under continuous erosion. However, under the REWILDING MAFORKI proposed project, clearing will be by slashing and the cleared material (thrash) is left on the surface to decompose and then mixed into the soil to act as soil nutrient. The land therefore is not left completely bare. Erosion under this condition is slight to moderate until weeds grow to give a cover. The process would be repeated for the initial few years (about 2 – 3 years) when the tree canopy would begin to form to give some cover.

***The impact of the erosion and soil nutrient loss is negative, direct, reversible and local. It is short term. The potential consequence is considerable with a medium (40-60%) probability of occurrence. The degree of significance of the impact is rated as moderate.***

| ***Land Clearing on soil erosion and soil nutrients*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-30* |
| ***Overall Impact Rating*** | ***Moderate*** |

**Recharge of Aquifers**

Land clearing is normally carried out during the dry months. This REWILDING MAFORKI activity will expose the soil to increased evaporation if the vegetative cover acting as mulch is removed for seedling planting. Initial rains cause surface sealing and thus reducing soil permeability. The reduced surface water infiltration, increased surface runoff and dryness of the soil increase the soil and artesian moisture deficit between monthly precipitations. Subsequently, groundwater recharge is reduced, increasing surface runoff to valleys and streams. REWILDING

MAFORKI proposes to give the plant lines a 2m secondary tillage to reduce surface sealing of soils and thus allow for improved soil permeability.

***The impact is negative, direct and reversible. The effect is restricted to sites alone, and of short term duration. However, the potential consequences are small and temporal. The probability of occurrence is medium low (20-40%). The degree of environmental significance is therefore rated as moderate.***

| ***Land Clearing on Recharge of Aquifers*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -1 |
| Probability of Occurrence (Pr) | 2 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-26* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Material transport into water-bodies**

Land clearing is normally carried out in the dry months where wind speeds range from 1.3 - 2.2 m/s. This involves the removal of soil material, which may be transported and deposited in rivers and streams occurring at the bottom of slopes. The transported material normally consists of soil particles, organic debris and chemical elements contained in the soil. The organic debris is then likely to float on the surface of the water and get deposited elsewhere. The debris then dries out and some may be blown into stream and dry valleys. As the rainy season begins, the debris will decompose to reduce oxygen content for aquatic organisms. The chemical elements are then diluted with the water and flows away, while the soil particles, particularly sand, do not travel far and get deposited on the river bed. These deposits could either raise the bed of the affected rivers. This results in flooding during rains or silting and drying up of small streams. However, in the case of REWILDING MAFORKI, vegetative material is not removed from the site but rather mixed with the top soil layers to improve organic matter and essential nitrogen. Also the planned establishment of a vegetative buffer zone of 10 metres from the water bodies by REWILDING MAFORKI will significantly minimize the transportation of material into them.

***The potential impact is rated as negative, direct, and irreversible. It is also local and permanent. The potential consequence is considerable with a low (0-20%) probability of occurrence. The degree of significance is rated as minor.***

| ***Land Clearing on Material Transport into water bodies*** | ***Points*** |
|---|---|

| | |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 1 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-16* |
| ***Overall Negative Impact Rating*** | ***Minor*** |

**Eutrophication**

Land clearing can result in a lot of plant debris. These may be blown into streams river valleys and later carried out into main surface drinking water. Most of the transported plant debris will decompose to add dissolved organic matter into the water bodies. This tends to reduce oxygen content for aquatic organisms.

***The impact is negative, direct, reversible, restricted to the locality and short term. The consequence is considerable with medium (40-60%) probability of occurrence. The degree of environmental significance is moderate.***

| ***Land Clearing on Eutrophication*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-30* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

### 7.9.8 Aquatic Life

Vegetation clearing, when it happens in close vicinity to water channels, increases runoff and movement of soil and vegetable matter into streams. This debris may be deposited down- stream at the spawning sites of fishes or increase the organic matter content of the water to levels detrimental to other aquatic life. During the establishment phase (*first 5 years*) of the REWILDING MAFORKI project this is likely to be an annual occurrence. However, REWILDING MAFORKI has indicated in its operational plans that it will not conduct land clearing close to water bodies but rather proposes to install 10m buffer zones to protect such water systems and their aquatic life.

***The impact of land clearing on aquatic life is negative, direct and reversible. The scale of impact is local and the duration is short term. The potential consequences of the impact are small and the probability of this impact occurring is rated as low (0-20%). The degree of significance is therefore rated as Minor***

| ***Land Clearing on Aquatic Life*** | ***Points*** |
|---|---|
| Impact Description (Id) | **-4** |
| Magnitude (Mg) | **-2** |
| Duration (Dr) | **-2** |
| Potential Consequences (Pc) | **-1** |
| Probability of Occurrence (Pr) | **2** |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***-18*** |
| ***Overall Negative Impact Rating*** | ***Minor*** |

### 7.9.10 Livelihoods of migrant farmers

The clearing of lands for plantation development by REWILDING MAFORKI will affect the livelihoods of farmers who have established farms in some of REWILDING MAFORKI compartments. This is because most farmers sell the outputs from farms to the market and surrounding areas. This land clearing activity could therefore affect the incomes of the illegal farmers and may also impact the supply and availability in local markets.

***The impact of this activity is negative, direct and irreversible. The scale of the impact is site specific and duration is permanent. The potential consequence is rated as considerable and the probability of this occurring is rated as medium high (60-80%). The degree of significance is therefore rated as Major***

| ***Land clearing on Livelihoods of illegal farmers*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 4 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-60* |

| | |
|---|---|
| ***Overall Negative Impact Rating*** | ***Major*** |

Soil Tillage/Preparation

**Soil nutrient enhancement**

The project's ultimate benefit to the soil when the trees are established would be the enhancement of soil nutrients as a result of the creation of favourable environments for the soil's macro and micro-organisms. The shade and micro climate provided by the tree canopy will lower temperature, increase humidity; and coupled with the leaf litter on which the organisms will feed, this will provide conditions for nutrient cycling. Furthermore, the soil enrichment fertilizers to be used on the project are Urea and Nitrogen based and will therefore contribute much needed nitrogen and phosphorus to the soils. In addition, michoriza (*a root volume supplement*) will be added to increase root surface volume and the uptake of phosphate. Cover crops such as cow peas for nitrogen fixing will also be introduced to reduce the application of non-organic fertilizer.

***Generally, this is rated positive, direct, reversible and local. It is permanent and the potential consequence is great. The probability of occurrence is high (80-100%) with degree of significance rated as major.***

| ***Soil Tillage on enhancement of soil nutrients*** | ***Points*** |
|---|---|
| Impact Description (Id) | 4 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | ***65*** |
| ***Overall Positive Impact Rating*** | ***Major*** |

**Soil erosion**

The physical properties of the soils indicate that they are highly susceptible to severe erosion as a result of the sandy topsoil and the steep slopes. During the erosion process, soil particles (topsoil) are removed by run-off emanating from rains. The material transported down the slopes is deposited in the lowlands. Rills and gullies may be created while soil nutrients may also be carried away. The deposited material ending up in streams and rivers could result in siltation and consequently facilitate the drying up of water in the channels and even affect domestic consumption. REWILDING MAFORKI has recognized this natural phenomenon and by adopting

measures such as ridging along contours, controlled ploughing in parallel to contours, mechanical pitting etc, soil erosion will be greatly minimized.

***The impact is negative, direct, irreversible, regional in character and permanent. The potential consequences are rated as great. The probability of occurrence is rated as medium (40-60%). The degree of significance is rated as Major.***

| ***Soil tillage on soil erosion*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -3 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -3 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-54* |
| ***Overall Negative Impact Rating*** | ***Major*** |

**Contamination of nearby water bodies from sedimentation**

During the erosion process, soil particles (topsoil) are removed by run-off emanating from rains and the material transported down-slope and deposited in the lowlands. The deposited material ending up in streams and rivers could result in siltation and consequently facilitate the drying up of water in the channels. The volume of transported materials may be significant particularly with road construction. However, with the creation of a vegetative buffer along rivers and streams as indicated in the Environmental Management Plan of REWILDING MAFORKI, most of the sediments and contaminants would be trapped.

***This impact is negative, direct, irreversible and local. It is permanent and of considerable potential consequences. The probability of occurrence is medium (40 – 60%) and the degree of significance is moderate.***

| ***Soil tillage on sedimentation of water bodies*** | ***Points*** |
|---|---|
| Impact Description (Id) | **-8** |
| Magnitude (Mg) | **-2** |
| Duration (Dr) | **-4** |
| Potential Consequences (Pc) | **-2** |
| Probability of Occurrence (Pr) | **3** |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | ***-48*** |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

Slash Management

**Smoke inhalation by workers and surrounding settlements**

Slash is defined as twigs, branches and small remnants of non-marketable timber. During thinning of plantations and harvesting of trees, slash is a normal consequence of such operations. However, poor management of slash can be a dry fuel source for fire ignition and fire spread. In the event of fire, smoke inhalation can be a trigger source of respiratory diseases such as asthma, breathing problems and other cardiovascular diseases. REWILDING MAFORKI, as part of its operational and environmental management plans for its allocated areas, has developed a detailed set of procedures for fire management and prevention; as well as training programmes for its entire field staff.

***This impact is rated as negative, direct and reversible. The scale of the impact is local and of short term duration. The potential consequences are considerable and the probability of this impact occurring is medium low (20-40%). The degree of significance is therefore rated as minor.***

| ***Poor Slash management on workers health*** | ***Points*** |
|---|---|
| Impact Description (Id) | **-4** |
| Magnitude (Mg) | **-2** |
| Duration (Dr) | **-2** |
| Potential Consequences (Pc) | **-2** |
| Probability of Occurrence (Pr) | **2** |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-20* |
| ***Overall Negative Impact Rating*** | ***Minor*** |

**Slow release of nutrients into soils**

Under slash management, the slashed material left on the forest floor will provide organic material that will decompose to improve the organic matter status of the soil. This will result in nutrients being held and slowly released into the soil. Release of nutrients into the soil would be rapid due to the sandy nature of the topsoil in the reserve. The topsoil is usually the storage reservoir for the nutrients from where they are released for use by plant species. It is the organic matter that holds the nutrients. The slash will also serve as a protective cover to minimize run-off and erosion.

***The impact is rated as positive, direct, irreversible, local, short term. The potential consequences are considerable. The probability of occurrence is medium high (60-80%).***
***The degree of significance is rated as moderate.***

| *Slash Effect on improving soil nutrients* | *Points* |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 2 |
| Potential Consequences (Pc) | 2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *42* |
| ***Overall Positive Impact Rating*** | ***Moderate*** |

**Soil damage**

During slash management, a lot of wood debris and biomass accumulated on the surface serve as material that could potentially cause fire. In the event of such fires, tree canopies may be temporarily lost; resulting in soil exposure and destruction of the soil structure. Soil improvement organisms e.g. earthworms and ants may also be affected. All these affect the general fertility status of the soil.

***The impact is rated as negative, direct, reversible, local and medium term The potential consequences in the event of fire is great. The probability of occurrence is medium low (2040%). The degree of significance is rated as Minor.***

| *Parameter* | *Points* |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -3 |
| Potential Consequences (Pc) | -3 |
| Probability of Occurrence (Pr) | 2 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-24* |
| ***Overall Negative Impact Rating*** | ***Minor*** |

**Protection of soil moisture**

Soil moisture in the soil is normally held by clay and organic matter content which are low in the soils of the reserve. Alternate means of preserving moisture in the soil is by mulching. This

involves providing cover in the form of vegetative thrash or any suitable material that will prevent evaporation of moisture from the soil. Slash management therefore would be a beneficial activity that will provide mulching material to the soil. This will compensate to some extent for unfavourable sandy nature and the low organic matter status.

***This impact is rated as positive, direct, irreversible, local, and short term. The potential consequence is great. The probability of occurrence is high (80-100%) and the degree of significance is Major.***

| ***Protection of soil moisture*** | ***Points*** |
|---|---|
| Impact Description (Id) | **8** |
| Magnitude (Mg) | **2** |
| Duration (Dr) | **2** |
| Potential Consequences (Pc) | **3** |
| Probability of Occurrence (Pr) | **5** |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *75* |
| ***Overall Positive Impact Rating*** | ***Major*** |

Planting of trees

**Development of micro climate**

Few years after tree establishment and canopy closure, micro-climatic condition developing as a result, would impact positively on the immediate environment. The various elements of the micro-climate (air/soil moisture, light intensity, air movement, air/soil temperature etc.) at the planting site are expected to change progressively and stabilize when the planted trees have gained their maximum height growth. A unique micro-climate will be created in the plantation that will have beneficial effects on the surrounding environment. The shade effect would lower temperature and the trees would also serve as wind breaks. At a local level, a favorable micro-climate would also be created for wildlife habitat and soil organisms within the established plantations. These benefits will include reduction in wind speed; stabilization of relative humidity and; soil nutrient re-cycling.

***This impact is rated as positive, direct, local, reversible and short term. The potential consequence is considerable with high (80-100%) probability of occurrence. The degree of significance of such an impact is therefore rated as Major.***

| ***Development of a micro climate*** | ***Points*** |
|---|---|

| | |
|---|---|
| Impact Description (Id) | **4** |
| Magnitude (Mg) | **2** |
| Duration (Dr) | **2** |
| Potential Consequences (Pc) | **2** |
| Probability of Occurrence (Pr) | **5** |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *50* |
| ***Overall Positive Impact Rating*** | ***Major*** |

**Transformation of landscape**

When the tree seedlings get established and the trees gain significant height growth (15-30m), the forest canopy cover will be transformed from the open patchy forest to continuous canopy. In the wet season the canopy will be closed to give luxuriant horizons of green canopy that will enhance the aesthetic view of the landscape. In the areas to be planted to Teak which is a deciduous tree, the canopy will change from green to grey in the dry season to break the monotony of the green canopy. The resultant effect of this on the overall degraded state of the reserve will be a much desired positive transformation of the landscape.

***This impact is rated as positive, direct and irreversible. The scale of impact is local and the duration is short term. The potential consequences could be considerable and the probability of this impact occurring is high (80-100%). The degree of significance of the impact is therefore rated as Highly Beneficial.***

| ***Transformation of Reserve Landscape*** | ***Points*** |
|---|---|
| Impact Description (Id) | **8** |
| Magnitude (Mg) | **2** |
| Duration (Dr) | **4** |
| Potential Consequences (Pc) | **3** |
| Probability of Occurrence (Pr) | **5** |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Carbon sequestration**

Carbon sequestration is closely related to climate change mitigation. Trees and forests are well known to be very efficient carbon storage systems. According to the UN Convention on Climate Change, fast growing tree plantation forests can store approximately 19-20 tons of carbon per

hectare per year. With 5000 hectares of plantations to be established, the REWILDING MAFORKI plantations can potentially sequester 100,000 tons of carbon per annum.

***This impact is positive, indirect and irreversible. The scale of the impact is local and the duration is medium term. The potential consequence of such an impact will be considerable. The probability of this impact occurring is rated as medium (40-60%). The degree of significance is therefore rated as Major Beneficial.***

| ***Carbon Sequestration*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 3 |
| Potential Consequences (Pc) | 2 |
| Probability of Occurrence (Pr) | 3 |
| ***Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr*** | ***65*** |
| ***Overall Positive Impact Rating*** | ***Major Beneficial*** |

Use of Agrochemicals for Weed control

**Contamination of soil, water bodies and aquatic life**

Glyphosate is used for weed control and is administered by spray. This form of application results in the chemical being applied mainly to foliage. It contains phosphorus which is beneficial to the soil. However, poor application and control of use may result in applying high concentrations of the chemical and in some cases spillage. Furthermore, inappropriate disposal of containers can be a source of contamination that can impact negatively on soil organisms and water bodies.

***The impact is rated as negative, indirect and irreversible with local impact. The duration of impact is short term, with small or temporary potential consequences. The probability of occurrence is medium (40-60%). The degree of significance is rated moderate.***

| ***Use of Agro chemicals for weed control*** | ***Points*** |
|---|---|
| Impact Description (Id) | -6 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -1 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-33* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

### Aquatic Life

The main agrochemical to be used by the project is a glyphosate weedicide for the control of weeds and Urea-Nitrogen for soil enrichment. It is most likely that some nutrients such as nitrates and phosphorus may be dissolved during rains and through runoff be transported into rivers and streams. The dissolved nutrients encourage excessive growth of aquatic plants and cause eutrophication. This results in depletion of oxygen content in water bodies. Excessive amounts are detrimental to the health of aquatic life including fish. The main rivers in the reserve are used for fishing by the small local communities and therefore any uncontrolled use of chemicals in close proximity to water bodies is likely to affect local communities who use the rivers for fishing.

***This impact is rated as negative, direct, reversible, local and short duration. The potential consequence is considerable with medium (40-60%) probability of occurrence. The degree of significance is rated as moderate.***

| ***Aquatic life*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-30* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

### Health and safety of workers

Inappropriate control and use of agrochemicals can affect the health and safety of the workers via inhalation and/or direct contact with the body. This is recognized in the Environmental management plan of REWILDING MAFORKI. To ensure proper control and use of such chemicals, REWILDING MAFORKI provides protective clothing such as nose masks, boots, helmet and overalls for all staff likely to come into contact with agro-chemicals.

***The impact is rated as negative, direct, irreversible and local. It is short term and the potential consequence is considerable. The probability of occurrence is medium (40-60%) and the degree of significance is moderate.***

| ***Use of chemicals on health and safety of workers*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |

| | |
|---|---|
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-42* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

Thinning and Maintenance of Tree Stands

**Soil compaction and erosion**

Activities involved in thinning and maintenance of tree stands will include the use of heavy vehicular haulage trucks expected to cause some disturbance to the soil. The potential impact is soil compaction that will be caused by heavy trucks. The compaction will result in run-off and soil erosion.

***The impact is rated negative, direct, reversible, local and short term. The potential consequence is considerable with medium high (60-80%) probability of occurrence. The degree of significance is moderate.***

| ***Soil compaction and erosion from thinning and maintenance*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 4 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-40* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Sedimentation run-off into water bodies**

During thinning and maintenance of tree stands, the tree canopy tends to open up. The rain drops from leaves of trees cause detachment of soil particles. Any runoff picks up the detached soil particles and moves them permanently elsewhere as sediments. In the process some fine particles such as clay are carried in suspension into streams. The movement of soil particles by runoff increases with the slope of the land. Permanent land shapes such as rills and gullies may thus be

created. This may negatively affect the aesthetics of the reserve landscape. However, the residues from the thinning process will limit sedimentation run-off.

***The impact is negative, direct, irreversible, local and permanent. The potential consequences are rated as considerable. The probability of occurrence is medium (4060%). The activity is therefore rated as Moderate.***

| ***Sedimentation run off into water bodies*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-48* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

Harvesting and Felling

**Landscape aesthetics**

The topography is undulating with lowlands ranging from approximately 130-480m. The reserve is also traversed by many tributaries and intermittent streams of the main rivers. REWILDING MAFORKI proposes to limit widespread harvesting of trees by adopting landscape planning, selective harvesting techniques and ensuring that the forest landscape is maintained as far as is practically possible. However, harvesting and felling practices will have an effect in defining the characteristics of the topography by opening up certain compartments for harvesting.

***The impact is negative, direct and irreversible. The scale of the impact is local and the duration is permanent. The potential consequences are rated as small and the probability of this impact occurring is rated as medium (40-60%). The degree of significance of the impact is therefore rated as Moderate.***

| ***Harvesting and Felling on Landscape aesthetics*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -1 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *45* |

| | |
|---|---|
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Damage to corridors used by fauna and Loss of flora**

The REWILDING MAFORKI reforestation project will result in the creation of desired habitats and corridors for fauna. However, there will be some harvesting of some of the trees to realize the economic value of the project. Harvesting and felling activities will result in the use of harvesting equipment like harvesters and chain saws. This activity will interrupt the corridors used by fauna in the short term and also result in some loss of flora from the forest floor.

***This is a negative impact, direct and reversible. The impact scale is site specific and the duration is short term. The probability of this impact occurring is High (80-100%) and the potential consequences are considerable. The degree of significance of the impact is rated as Moderate.***

| ***Damage of fauna corridors and loss of flora*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -1 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-40* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Soil compaction and erosion**

Harvesting activities require the use of machines like tractors, harvesters, haulage trucks etc. The use of such machinery would disturb the soils in the harvesting area and the routes for transportation of harvested materials. The heavy machines would definitely compact the soil which, as a result, will affect soil porosity and reduce infiltration. In the event of rain, high run-off would therefore be created and this will cause erosion. REWILDING MAFORKI has planned to adopt low impact harvesting methods, which will reduce soil compaction and erosion.

***The impact is rated negative, direct, reversible, local and short term. The potential consequence is considerable with medium high (60-80%) probability of occurrence. The degree of significance is moderate.***

| ***Soil compaction and erosion from harvesting*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |

| | |
|---|---|
| Magnitude (Mg) | -2 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -2 |
| Probability of Occurrence (Pr) | 4 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-40* |
| ***Overall Negative Impact Rating*** | ***Moderate*** |

**Dispersal of dust on workers and community health**

Harvesting and felling activities are likely to generate dust from use of harvesting machinery within compartments and log transport machinery using logging roads. This is inevitable and the extent to which roads are properly constructed and compacted will influence the amount of dust generated. The dust, albeit on a very small scale, may affect the health of workers and operators of forest machinery. REWILDING MAFORKI actively enforces the use of dust masks and protective gear during field operations and it is therefore expected that any effects from dust will be very small indeed. From a community point of view, the distances (3-5km) from the project area to the nearest towns are such that there is no anticipated effect on any community.

***The impact is rated negative, direct and reversible. The scale of the impact is site only specific and duration is short term. The potential consequence is small with a medium low (20-40%) probability of occurrence. The degree of significance is therefore rated as Minor.***

| ***Dust Dispersal on health of workers and community*** | ***Points*** |
|---|---|
| Impact Description (Id) | -4 |
| Magnitude (Mg) | -1 |
| Duration (Dr) | -2 |
| Potential Consequences (Pc) | -1 |
| Probability of Occurrence (Pr) | 2 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-16* |
| ***Overall Negative Impact Rating*** | ***Minor*** |

Forest Fire Management

The project sites has been the subject of many forest and bush fires. This was mainly due to the degraded nature of the reserve, absence of trees and torching of land by farmers for agricultural activities. During thinning of plantations, road construction and harvesting of trees, there will be sufficient amounts of slash (*twigs, branches, bark and vegetation*) generated and this can

contribute to fire ignition and spread if proper fire management procedures are not observed. A fire management strategy serves to:

- ✓ Support regeneration efforts
- ✓ Prevent destruction of wildlife habitats and biodiversity
- ✓ Protect communities from smoke related diseases from bush fires
- ✓ Protects community livelihoods gained from farming and tree planting
- ✓ Protects the long term benefits accruable to stool landowners and the local community from the sale of forest outputs.

REWILDING MAFORKI has outlined a fire management strategy as part of its Environmental Management Plan and already has firefighting equipment and vehicles with water available to quickly tackle incidences of fire if and when they do occur. Whilst the focus is always on fire preventive measures, staff and workers have been trained in firefighting techniques; in the event that a fire does occur in parts of the reserve.

***The impact of a fire management strategy is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%). The degree of significance is therefore rated as Highly Beneficial.***

| ***Fire Management and Prevention*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

Labour and Staff Recruitment

**Employment and Income**

The REWILDING MAFORKI proposed development seeks to employ various workers and staff at different stages of the proposed development. REWILDING MAFORKI has estimated that it would seek to directly employ approximately 260 staff at various stages, namely:

- ✓ Nursery and Seedlings Development 40
- ✓ Land preparation, planting and management 100
- ✓ Roads and Maintenance 20
- ✓ Office, Admin and Security Staff 30
- ✓ Treatment plant 40

REWILDING MAFORKI currently pays its field workers a minimum wage per day and confirms that this will be the minimum wage paid to future workers hired by the company. REWILDING MAFORKI also provides food and transport for its workers daily.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| ***Employment from Labour Recruitment*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Gender Equality**

Field surveys and discussions with REWILDING MAFORKI have revealed that of the workers currently employed to assist in small land preparation and trials, approximately 48% are women. REWILDING MAFORKI is committed to ensuring that women play an active role in its plantation project as far as is practically possible. It is well known that women are best suited for undertaking certain plantation forestry tasks such as preparing seedlings and transplanting in the field. This is a positive move in promoting gender balance and equality; as well as improving the incomes and livelihoods of women.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| *Gender Balance* | *Points* |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

Key Stakeholder Interests

**Revenue streams from forest outputs for key stakeholders**

REWILDING MAFORKI's plantation development model requires significant investments in capital and equipment in the early years to establish plantations. REWILDING MAFORKI is committed to investing in the establishment of 25,000ha of tree plantations over a six year period. During this period, significant investments are made in plant, equipment, seedlings, forest machinery, labour, subsistence, transport, forest infrastructure and agro-chemicals. After the 6$^{th}$ year, it is expected that some revenues will begin to accrue from thinnings and sale of carbon credit and small diameter logs for electric poles.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| *Stakeholder Revenues from Forest outputs* | *Points* |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Sharing of forest revenues**

The REWILDING MAFORKI proposed development will pay financial benefits accruable to landowners and is defined in benefit sharing agreements between the company and the Forestry Commission.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| ***Benefit Sharing amongst 3 stool landowners*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Development of a vocational training centre**

During deliberations and discussions with landowner stakeholders, they expressed their desire to establish a vocational training centre to support the development of vocational skills for the youth in the area. This is an initiative that REWILDING MAFORKI supports and as a demonstration of its commitment to social causes and skills development in the area.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| ***Development of Vocational Training Centre*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |

| | |
|---|---|
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Support for Educational Grants**

Landowners and community leaders have expressed their desire to have scholarships and educational grants to support deserving youth; with a particular emphasis on forestry, fishing and agriculture. REWILDING MAFORKI has committed portion of its annual budget to support good causes in the area. These causes will be reviewed on a case by case basis by the company and appropriate support offered where necessary. Whilst REWILDING MAFORKI has not specifically committed itself to any scholarships and grants, such a commitment will serve to strengthen community relationships; as well as assist in supporting some of the educational goals and aspirations of deserving students in the area.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are considerable and the probability of the impact occurring is rated as medium (40-60%) The degree of significance is therefore rated as Moderate.***

| ***Support for local good causes*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 2 |
| Probability of Occurrence (Pr) | 3 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *48* |
| ***Overall Positive Impact Rating*** | ***Moderate*** |

**Monitoring and Management of the Reserve**

REWILDING MAFORKI operational activities will also serve to inform the Forestry Unit and landowners about various activities and developments in the concession area –illegal settler activities, illegal logging activity, land use for farms, community access to the reserve, use of non-timber forest products etc.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact***

***occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| ***Monitoring and Management of the Reserve*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Poverty alleviation and health**

According to the UN declaration at the World Summit on Social Development in Copenhagen (1995) extreme poverty is defined as *"a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information"*

The REWILDING MAFORKI proposed development plays an important role in addressing the basic human needs of its workers. To this end the REWILDING MAFORKI provides transport, food and safe drinking water for its workers. By providing gainful employment for its workers, income earned by workers will enable them to improve some of their basic human needs. Education and awareness programmes for its workers also contribute to alleviating poverty. REWILDING MAFORKI has already sensitized its current workers participating in its land trials, on the need to adopt proper basic health and safety practices pertaining to the use of plant and machinery, agrochemicals, farming tools and handling of materials. In support of its commitment to promoting better welfare of its employees, the company has appointed a Safety, Health and Environmental Quality Manager.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| ***Poverty alleviation and health*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |

| | |
|---|---|
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 2 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *80* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

**Job creation and Demographics**

The REWILDING MAFORKI project is already having a positive impact on the population and community. REWILDING MAFORKI is currently the second largest employer (160 staff) in the area. Subject to meeting its planting objectives, the REWILDING MAFORKI project is hoping to employ extra staffs within the next 6-10 years. This is likely to be when it is able to find more land for plantations.

This will have a positive impact on job creation, the major socio-economic objective of the District. It is also anticipated that this development will lead to the establishment of support industries and the resultant employment that could arise and benefit the local populace.

***The impact is positive, direct and irreversible. The scale of impact is local and the duration is permanent. The potential consequences of the impact are great and the probability of the impact occurring is rated as high (80-100%) The degree of significance is therefore rated as Highly Beneficial.***

| ***Job Creation and Demographics*** | ***Points*** |
|---|---|
| Impact Description (Id) | 8 |
| Magnitude (Mg) | 2 |
| Duration (Dr) | 4 |
| Potential Consequences (Pc) | 3 |
| Probability of Occurrence (Pr) | 5 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *85* |
| ***Overall Positive Impact Rating*** | ***Highly Beneficial*** |

### 7.19.9 Squatter Farming and Cattle Grazing

The degradation of the project sites into open wood land with growth of grasses has attracted many illegal cattle herdsmen and farmers within the areas allocated to REWILDING MAFORKI by the community. These settlers have established illegal farms in the area and in areas allocated to REWILDING MAFORKI.

REWILDING MAFORKI would try to support such farmers in harmony with the Company's forestry operations by offering them alternative employment with the project; but to no avail.

***The impact is negative, indirect and irreversible. The scale of impact is site specific and the duration is permanent. The potential consequences of the impact are small and the probability of the impact occurring is rated as medium high (60-80%) The degree of significance is therefore rated as Major***

| ***Squatter Farming and Cattle Grazing*** | ***Points*** |
|---|---|
| Impact Description (Id) | -8 |
| Magnitude (Mg) | -2 |
| Duration (Dr) | -4 |
| Potential Consequences (Pc) | -1 |
| Probability of Occurrence (Pr) | 4 |
| *Degree of Significance of Impact (Dsig) = (Id+Mg+Dr+Pc) x Pr* | *-60* |
| ***Overall Negative Impact Rating*** | ***Major*** |

**TABLE 7.1: SUMMARY OF NEGATIVE IMPACTS**

| Project Activity | Impact Parameter | Assessment Scores | Overall Negative Rating |
|---|---|---|---|
| Establishment of Nursery | Use of Groundwater | -16 | Minor |
| Landscape Planning | Land use by towns of BKM Chiefdoms | -14 | Minor |
| Landscape Planning | Wetlands and Riparian strips | -36 | Moderate |
| Site and Species Matching | Soil nutrients | -40 | Moderate |
| Road Construction | Soil erosion | -68 | Major |
| Road Construction | Surface Run Off | -68 | Major |
| Road Construction | Impoundments of seasonal streams | -36 | Moderate |
| Road Construction | Contamination of water bodies | -45 | Moderate |
| Road Construction | Noise Pollution on workers | -14 | Minor |
| Road Construction | Dispersal of dust | -24 | Minor |
| Road Construction | Clearing of vegetation | -48 | Moderate |
| Road Construction | Increased access to the reserve | -39 | Moderate |
| Land Clearing | Loss of vegetation and flora | -70 | Major |
| Land Clearing | Disturbance of wildlife habitats | -42 | Moderate |
| Land Clearing | Soil erosion and loss of soil nutrients | -30 | Moderate |
| Land Clearing | Recharge of Aquifers | -26 | Moderate |
| Land Clearing | Material transport into water bodies | -16 | Minor |
| Land Clearing | Eutrophication | -30 | Moderate |
| Land Clearing | Seasonal flooding | -70 | Major |
| Land Clearing | Aquatic Life | -18 | Minor |
| Land Clearing | Clearing of illegal farms | -60 | Major |
| Land Clearing | Loss of livelihoods of migrant farmers | -60 | Major |

| | | | |
|---|---|---|---|
| Soil Tillage/Preparation | Soil Erosion | -54 | Major |
| Soil Tillage/Preparation | Sedimentation of nearby water bodies | -32 | Moderate |
| Slash Management | Fire risk from poorly managed slash | -20 | Minor |
| Slash Management | Soil damage from fire | -24 | Minor |
| Planting of trees | Use of weedicides for weed control | -33 | Moderate |
| Use of Agro-chemicals | Soil Contamination | -33 | Moderate |
| Use of Agro-chemicals | Effect on aquatic life | -30 | Moderate |
| Use of Agro-chemicals | Health and Safety of workers | -42 | Moderate |
| Thinning and Maintenance of tree stands | Soil compaction and erosion | -40 | Moderate |
| Thinning and Maintenance of tree stands | Sedimentation run-off | -48 | Moderate |
| Harvesting and Felling | Damage to fauna corridors and flora | -40 | Moderate |
| Harvesting and Felling | Soil compaction and erosion | -40 | Moderate |
| Harvesting and Felling | Dust inhalation by locals | -16 | Minor |
| Establishment of Treatment plant | Economic migration | -45 | Moderate |
| Clearing of squatter farms | Loss of farms and livelihoods | -60 | Major |

**TABLE 7.2: SUMMARY OF POSITIVE IMPACTS**

| Project Activity | Impact Parameter | Assessment Scores | Overall Positive Rating |
|---|---|---|---|
| Landscape Planning | Land Use | 85 | Highly Beneficial |
| Landscape Planning | Harvesting and Slash management | 55 | Major Benefit |
| Landscape Planning | Protection of rich biodiversity habitats | 64 | Major Benefit |
| Landscape Planning | Protection of indigenous tree species | 80 | Highly Beneficial |
| Landscape Planning | Protection of Archaeological/Cultural sites | 64 | Major Benefit |

| | | | |
|---|---|---|---|
| Site and Species Matching | Improvements to soil properties | 65 | Major Benefit |
| Soil Tillage/Preparation | Enhancement of soil nutrients | 65 | Major Benefit |
| Slash management | Release of nutrients into soils | 42 | Moderate |
| Slash management | Protection of soil moisture | 75 | Major |
| Planting of trees | Development of micro climates | 50 | Major |
| Planting of trees | Transformation of reserve landscape | 85 | Highly Beneficial |
| Planting of trees | Carbon credits from sequestration | 65 | Major Benefit |
| Planting of trees | Inter-cropping by local farmers | 36 | Moderate |
| Harvesting and Felling | Landscape aesthetics | 45 | Moderate |
| Fire Management and Prevention | Protection of reserve and community | 85 | Highly Beneficial |
| Establishment of Treatment plant | Job Creation | 85 | Highly Beneficial |
| Establishment of Treatment plant | Development of support industries | 85 | Highly Beneficial |
| Labour and Staff Recruitment | Employment and Income | 85 | Highly Beneficial |
| Labour and Staff Recruitment | Promoting Gender Equality | 85 | Highly Beneficial |
| Payment of Stakeholder Benefits to Stool | Revenue from sale of Forest products | 85 | Highly Beneficial |
| Payment of Stakeholder Benefits to Stool | Equal sharing of benefits amongst stakeholders | 85 | Highly Beneficial |
| Funding support for Vocational Centre | Support for vocational training | 85 | Highly Beneficial |
| Supporting educational grants and scholarships | Supporting educational causes | 48 | Moderate |
| Monitoring and management of reserve | Improved reserve Management | 85 | Highly Beneficial |
| Improved earnings of workers | Poverty Alleviation and health improvement | 80 | Highly Beneficial |
| Project Presence on Reserve Lands | Limiting illegal farm allocations/activities | 85 | Highly Beneficial |
| | | | |
| | | | |

# CHAPTER 8: MITIGATION OF IMPACTS

Having identified the potential impacts and possible alternatives of the REWILDING MAFORKI proposed development on various aspects of the environment and stakeholder groups, various suggestions were proffered as mitigations for some of the impacts. Where impacts are identified as negative, suggestions have been made to minimize the impact on the environment and stakeholders.

The mitigation measures suggested for the potential impacts of the REWILDING MAFORKI proposed development takes into account the following:

a) The Environmental Assessment Regulations of 2010.
b) The Water Use Regulations by National Water Resource Agency
c) The Key Project Activities proposed by REWILDING MAFORKI
d) The REWILDING MAFORKI Environmental Management Plan
e) Best available practices and technology for plantation forestry
f) Health and social well-being of local and surrounding communities and
g) Key Stakeholder interests and concerns

The potential impacts of the proposed development are rated in the following tables and prior to mitigations being suggested. The impacts are then rated again after the mitigations. This gives an overview of the effect of the mitigation in minimizing negative environmental, social and health impacts. The impact type whether Environmental (E), Social (S) or Health (H) is also indicated in the tables below.

Where impacts are generally positive, we have also prescribed enhancements which we deem will be value adding for the project, the environment and its stakeholders.

**Table 8.1: Mitigation Measures for Nursery**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Impact on Use of Groundwater* | Groundwater Recharge | E | • Negative<br>• Direct<br>• Local<br>• Short term<br>• Reversible | Minor | Even though water usage levels are only 3% of groundwater recharge, REWILDING MAFORKI should consider use of river water sources during the rainy seasons and make use of groundwater during the dry season. This is will mean conducting water quality tests of river water on a regular basis. | Minor |

**Table 8.2: Mitigation Measures for Landscape Planning**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Landscape Planning* | Expansion of Project areas | E, S | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Minor | In view of the scale of the development, REWILDING MAFORKI should avoid planting in areas with high biodiversity and seek to obtain replacement lands for these areas. | Hardly Any |
| | Management of Slash Material | E, H | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Reversible | Major | Even though positive, REWILDING MAFORKI should monitor and control slash; as well as provide training to all workers on effective slash management | Major |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Availability of Land for farms | E, S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | REWILDING MAFORKI should develop strong stakeholder relationships with stool landowners and keep them informed of plantation developments. Conduct workshops to inform legitimate farmers about community farming practices and need to avoid farming in unauthorized areas of the project | Major |

**Table 8.3: Mitigation Measures for Site and Species Matching**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Site and Species Matching* | Depletion of Soil Nutrients | E, S | • Negative<br>• Direct<br>• Local<br>• Temporary<br>• Reversible | Moderate | REWILDING MAFORKI should apply both organic and inorganic fertilizers. This will help in improving the nutrient status of the soils. | Minor |
| | Colonization by Invasive Species | E | • Negative<br>• Indirect<br>• Local<br>• Permanent<br>• Irreversible | Minor | REWILDING MAFORKI should closely monitor the quality and source of its approved seedlings to ensure that only approved non-invasive seedlings are used on the project; as invasive species are expensive to control and eliminate | Hardly Any |
| | Reduction of water table in wetlands and riparian areas | E | • Negative<br>• Indirect<br>• Local<br>• Permanent<br>• Irreversible | Moderate | Avoid planting Teak and Eucalyptus species near wetland and riparian areas. | Minor |

## Table 8.4: Mitigation Measures for Road Construction and Maintenance

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Road Construction and Maintenance* | Soil Erosion and Surface Run Off | E | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | New road construction should be kept to a minimum; roads must be well compacted to minimize erosion.<br>Where constructed, road alignment should observe gradient limits and land contours | Minor |
| | Contamination of water bodies and Impoundments of seasonal streams | E, S, H | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Reversible | Moderate | Culverts and drain bars should be installed to control and direct any run off at short intervals. Seasonal stream should be identified during road planning stage. Avoid road construction near water bodies. | Minor |
| | Noise Pollution | E, H | • Negative<br>• Direct<br>• Site Only<br>• Permanent<br>• Reversible | Minor | Enforce and monitor use of noise abatement devices by all relevant workers. Ensure adequate breaks from operating forest machinery | Negligible |
| | Increased levels of dust on Air Quality | E, H | • Negative<br>• Direct<br>• Site Only<br>• Temporary<br>• Reversible | Minor | Ensure reasonable speeds and frequency of use of forest machinery to minimize dust, ensure use of protective gear and avoid operating machinery in heavy winds | Negligible |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Clearing of vegetation | E, S | • Negative<br>• Direct<br>• Site Only<br>• Permanent<br>• Irreversible | Moderate | The slash produced during vegetation clearing should be used either as mulch or ploughed into the soil to improve the soil structure, water retention capacity and nutrient recycling. Ensure proper disposal of cleared vegetation where necessary | Minor |

**Table 8.5: Mitigation Measures for Land Clearing**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Land Clearing* | Clearing of vegetation | E | • Negative<br>• Direct<br>• Site Only<br>• Permanent<br>• Irreversible | Major | The slash produced during vegetation clearing should be used either as mulch or ploughed into the soil to improve the soil structure, water retention capacity and nutrient recycling. Fire should not be used as a tool in the land clearing as it destroys the soil humus. | Minor |
| | Disturbance of fauna habitats | E | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Minor | Fire should not be used as a tool in the land clearing as it destroys the beneficial soil micro fauna. Where ever possible snags (Senescent standing trees) and coarse wood debris should be retained to serve as dwelling sites for arboreal animals and arthropods respectively. | Minor |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Disruption of biodiversity | E | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Minor | Specimens of all plant species that are known to have special uses by the community should be introduced in the conservation areas through enrichment planting or aided natural regeneration. The conservation areas when created should be managed well to always retain representative composition of the original biodiversity of the site | Negligible |
| | Soil Erosion and nutrient loss | E | • Negative<br>• Direct<br>• Local<br>• Short term<br>• Reversible | Moderate | By adopting slashing methods, soil erosion is reduced by ensuring that cleared thrash is left on the soil surface. This slows down erosion. | Minor |

**Table 8.6: Mitigation Measures for Land Clearing- Contd**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Land Clearing* | Recharge of Aquifers | E | • Negative<br>• Direct<br>• Site Only<br>• Short Term<br>• Reversible | Moderate | Protect Soil surface with debris and mulch to avoid reduction of soil permeability, reduced infiltration and increased run off | Minor |
| | Eutrophication | E | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Moderate | Avoid land clearing activities close to water bodies to reduce the risk of plant debris being blown into water systems. | Minor |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Seasonal Flooding and Aquatic Life | E | • Negative<br>• Direct<br>• Local<br>• Short Term<br>• Irreversible | Major | Construct contour bunds to slow down the speed of run-off. As far as possible, avoid clearing large tracts of land during rainy season to limit run off and deposits of debris in water systems; thus affecting aquatic life | Moderate |
| | Clearing of Illegal settler farms and damage to livelihoods | E, S | • Negative<br>• Direct<br>• Site Only<br>• Permanent<br>• Irreversible | Major | REWILDING MAFORKI should in future consider offering farmers employment with the project wherever possible. Collaborate with landowners and stakeholders in educating illegal settlers to desist from future encroachment of the plantation. Local farmers should also be included in this process | Minor |

**Table 8.7: Mitigation Measures for Soil Preparation**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Soil Preparation* | Soil Erosion | E | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Severe | Plant between contour bunds. Plough without harrowing. Plant on ridges across slope. Divide land preparation for seedling planting into contour strips. Strips should be separated by a year of soil preparation. | Moderate |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Contamination of nearby water bodies from sedimentation | E, S, H | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Moderate | REWILDING MAFORKI should avoid soil preparation on steep slopes close to water bodies.<br>REWILDING MAFORKI should create vegetative buffers alongside water bodies to protect them from soil sedimentation.<br>Conduct regular visual inspection of water bodies to ascertain any sedimentation of water bodies. | Minor |

**Table 8.8: Mitigation Measures for Slash Management**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Slash Management* | Smoke inhalation from slash burning by workers and surrounding settlements | E, H | • Negative<br>• Direct<br>• Local<br>• Short term<br>• Reversible | Minor | Ensure workers are properly trained in slash burning protocols and observe favorable weather conditions for burning of slash and ensure use of protective gear | Minor |
| | Soil damage | E | • Negative<br>• Direct<br>• Local<br>• Short term<br>• Reversible | Minor | Avoid having slash material in large floor areas. Consolidate slash in small groups and use as mulch for soils wherever possible.<br>Burning should be a last option and carried out under strictly controlled conditions to avoid fires. | Negligible |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Source of fire ignition and fire spread | E, S, H | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Ensure workers are properly trained in slash burning protocols and observe favorable weather conditions for burning of slash | Minor |

**Table 8.9: Mitigation Measures for Use of Agro-chemicals**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Weed Control* | Contamination of soils from agro-chemicals | E, S | • Negative<br>• Direct<br>• Local<br>• Short Term<br>• Irreversible | Moderate | REWILDING MAFORKI should control the application of weedicides to avoid overspills and over concentrations.<br>Ensure workers are properly trained in the use and disposal methods for chemicals.<br>Consider buying bulk quantities and premixing in larger quantities to avoid inappropriate disposal of smaller containers which could result in contamination of soils. | Minor |
| | Contamination of water bodies and aquatic life | E, S, H | • Negative<br>• Direct<br>• Local<br>• Short Term<br>• Reversible | Moderate | REWILDING MAFORKI should control the application of weedicides to avoid overspills and over concentrations.<br>Ensure workers are properly trained in the use and disposal methods for chemicals.<br>Avoid using weedicides in areas close to water bodies and avoiding using on steep slope areas near water bodies | Minor |

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| | Health risk to workers | E, S, H | • Negative<br>• Direct<br>• Local<br>• Short Term<br>• Reversible | Moderate | Ensure workers are properly trained in the use and disposal methods for chemicals.<br>Provide protective equipment and clothing for all staff who handle chemicals.<br>Conduct quarterly health checks on staff to ascertain any health effects | Minor |

**Table 8.10: Mitigation Measures for Thinnings and Maintenance**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Thinning and Maintenance* | Soil compaction and erosion | E | • Negative<br>• Direct<br>• Local<br>• Short Term<br>• Reversible | Moderate | Apply the Forest Logging Manual guidelines.<br>Thinning operations should be scheduled when the ground is hard | Minor |
| | Sedimentation run off into water bodies | E, H | • Negative<br>• Direct<br>• Local<br>• Short Term<br>• Reversible | Severe | REWILDING MAFORKI should avoid soil preparation on steep slopes close to water bodies.<br>REWILDING MAFORKI should create vegetative buffers alongside water bodies to protect them from soil sedimentation.<br>Conduct regular visual inspections of water bodies to ascertain any sedimentation of water bodies. | Moderate |

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| | Fire risk from dry fuel matter (*branches, twigs and slash)* | | • Negative<br>• Direct<br>• Local<br>• Short Term<br>• Reversible | Minor | Avoid large amounts of branches and twigs lying on forest floor.<br>Train workers in proper disposal of slash.<br>Avoid thinning large areas at any one time. | Negligible |

**Table 8.11: Mitigation Measures for Harvesting and Felling**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Harvesting and Felling* | Damage to corridors used by fauna and loss of flora | E | • Negative<br>• Direct<br>• Site Only<br>• Short term<br>• Irreversible | Moderate | Create conservations areas that may act as corridor.<br>Avoid harvesting in the corridor areas.<br>Retain dead and senescent trees to serve as snags.<br>Ensure that areas identified with rare floral species are not clear felled<br>Specimens of indigenous occurring naturally should be retained | Minor |
| | Soil compaction and erosion | E | • Negative<br>• Direct<br>• Local<br>• Short term<br>• Reversible | Moderate | Schedule harvesting when the ground is hard<br>Use extraction machinery with pneumatic or rubber tire<br>Adopt harvesting plan that minimizes road and skid trail network | Minor |
| | Noise Pollution from forest machinery | S, H | • Negative<br>• Direct<br>• Local<br>• Temporary<br>• Irreversible | Minor | Ensure all workers use noise protective gear such as earplugs and headphones to minimize noise from harvesting machinery.<br>Avoid prolonged operation of machinery. | Negligible |

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| | Alteration of landscape aesthetics | E | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Moderate | Avoid contiguous harvesting of large areas to minimise disruptions to landscape and ensure proper disposal and management of slash material. | Minor |
| | Fire risk from dry fuel matter | E, H | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Essential dry fuel matter (twigs, branches, offcuts, etc) are properly organized for controlled burning or disposal. Some leafs may be left on undergrowth to provide nutrients to soil once decomposed. | Minor |

**Table 8.12: Enhancement Measures for Fire Management**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Enhancement | Prescribed Enhancements | Rating after Enhancements |
|---|---|---|---|---|---|---|
| *Forest Fire Protection and Management* | Protection of stakeholder future revenues from forest outputs | S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Conduct regular stakeholder consultations on fire prevention measures in project area and outline support required from local communities and chiefs | Highly Beneficial |
| | Protection of worker livelihoods | S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Ensure active participation and awareness of impact of fires by workers to protect their livelihoods | Major |
| | Protection of health of local communities | S, H | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Conduct awareness campaigns with stool landowners, health authorities and opinion leaders on fire ignition, health risks and control. | Major |

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| | Support regeneration of reserve | E | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Collaborate with Forestry Division and Wildlife Division on effective fire management strategies and procedures | Highly Beneficial |
| | Protection of wildlife habitats and fauna | E, S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Implement appropriate and adequate fire breaks near and around wildlife habitats to avoid fire spread and damage to habitats | Major |

**Table 8.14: Enhancement Measures for Labour and Staff Recruitment**

| Project Activity | Potential Impact | Impact Type | Description of Impact | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Labour and Staff Recruitment* | Employment of locals | S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Seek to offer preferential employment to locals before considering non-local job seeking migrants wherever possible | Major |
| | Income generation for locals | S, H | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Seek regular opportunities to enhance income earning potential of workers; as this will help alleviate poverty and improve health | Major |
| | Gender balance and equality | S, H | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Reversible | Major | Create opportunities for women to obtain gainful employment with REWILDING MAFORKI wherever possible and support their overall welfare | Major |

## Table 8.15: Enhancement Measures for Landowner Expectations

| Stakeholder | Potential Impact | Impact Type | Description of Impact | Rating before Enhancement | Prescribed Enhancements | Rating after Enhancements |
|---|---|---|---|---|---|---|
| *Meeting Landowners Stakeholder Expectations* | Revenue streams from plantation outputs | S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Ensure regular consultations with landowners on progress of the project | Major |
| | Curtailing of illegal migrant farmers encroaching on the plantation | E, S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Collaborate with Forestry Division to share information and ideas for effective monitoring and management of the reserve | Major |
| | Employment, capacity building and training for local populace | S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Build capacity of employed workers through on the job training and skills development. Seek to employ more locals as and when the need arises. | Major |
| | Monitoring and Management of the reserve | E,S | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Collaborate with Forestry Division to share information and ideas for effective monitoring and management of the reserve | Major |
| | Allocation of reserve lands | S | • Negative<br>• Indirect<br>• Local<br>• Permanent<br>• Irreversible | Moderate | The company should review reserve boundaries within the project areas | Major |

**Table 8.16: Enhancement Measures for Forestry Division Expectations**

| Stakeholder | Potential Impact | Impact Type | Description of Impact | Rating before Enhancement | Prescribed Enhancement | Rating after Enhancement |
|---|---|---|---|---|---|---|
| *Meeting Forest Services Division Stakeholder Concerns* | Reforestation and management/ monitoring of the plantation | E, S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Collaborate with Forest Services Division to share information and ideas for effective monitoring and management of the reserve | Major |
| | Curtailing of Illegal encroachment of the plantation by illegal settlers | E,S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Collaborate with Forest Services Division to share information and ideas for effective monitoring and management of the reserve | Major |
| | Management and Control of Fire in the reserve | E, H | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Strengthen collaboration on fire monitoring and management. Implement rapid response fire alert procedures, skilled fire fighters and adequate fire equipment. Conduct fire hazard awareness programmes for farmers and local communities | Major |
| | Benefit sharing formula for sharing of future forest revenues | E,S | • Positive<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Collaborate with Forestry Division and the landowners to agree procedures and channels for payment/sharing of future forest benefits amongst landowners | Major |

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| | Re-allocation of previously abandoned plantations to serious minded investors | E | • Positive<br>• Indirect<br>• Local<br>• Permanent<br>• Irreversible | Major | Keep the key stakeholders informed on successes and benefits of the project to strengthen plantation development policies and mechanisms. | Major |

**Table 8.17: Mitigation Measures for Squatter Farmers and Herdsmen Expectations**

| Stakeholder | Potential Impact | Impact Type | Description | Rating before Mitigation | Prescribed Mitigation | Rating after Mitigation |
|---|---|---|---|---|---|---|
| *Meeting Squatter Farmers and Herdsmen Concerns* | Clearing of illegal farms | S | • Negative<br>• Direct<br>• Local<br>• Permanent<br>• Irreversible | Major | Avoid any clearing of farms found in allocated compartments and inform Key stakeholders who are the legal custodians of the land for action. | Minor |
| | Loss of access to lands for farming and cattle grazing | S | • Negative<br>• Indirect<br>• Local<br>• Permanent<br>• Irreversible | Minor | Seek opportunities to offer alternative employment; such as out grower schemes within the project wherever possible; | Minor |

**Table 8.18: Enhancement Measures for the Port Loko District Council Expectations**

| Stakeholder | Potential Impact | Impact Type | Description | Rating before Enhancement | Prescribed Enhancement | Rating after Enhancement |
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| *PLDC Expectations* | Creation of Employment Opportunities | S | • Positive<br>• Indirect<br>• Local<br>• Permanent<br>• Irreversible | Major | Provide regular updates on employment statistics. Collaborate to identify matching employment opportunities linked to planned developments. | Major |
| | Integration with local and regional development | E, S, H | • Positive<br>• Indirect<br>• Local<br>• Permanent<br>• Irreversible | Major | Collaborate with PLDC to discuss and contribute inputs into local and regional development plans. | Major |

## CONCLUSION

The ESIA process has been professionally carried out and the ESIA report comprehensively assessed the Project's potential beneficial and adverse impacts, and recommended mitigation measures needed to prevent, minimize, mitigate or compensate for adverse impacts and to enhance environmental and social project benefits.

Specifically, and in accordance with the EPA Act 2008 and the supplementary EPA Act 2010, the ESIA study has adequately addressed the following:

- Described and analyzed the initial state of the Project site and its physical, biological, socio-economic and human environment;
- Described and analyzed all the natural and socio-cultural elements and resources likely to be affected by the Project, including the reasons for selecting the Project site;
- Described the Project and reasons for its choice among other possible alternatives;
- Identified, predicted, evaluated and assessed the potential effects and impacts of the Project on the natural and human environment;
- Identified and designed mitigation measures to avoid, reduce, correct or compensate for the adverse environmental and socio-economic impacts of the Project;
- Designed an Environmental and Social Management Plan (ESMP) comprising project and environmental monitoring mechanisms and costs, where necessary;
- Formulated a Resettlement Policy Framework (RPF);
- Formulated a Community Development Action Plan (CDAP); and
- Planned a Public Disclosure and Consultation Process (PDCP).

After appropriate application of the proposed mitigation measures, provided in this ESIA report, to different assessed activities/pathways; proper implementation of the recommended monitoring plan; and ensuring normal efficient operation; residual impacts from the following significantly and moderately negative environmental and socio-economic impacts are expected to be minor (insignificant) or insignificant:

Based on the assessment of the potential environmental and socio-economic impacts (after application of mitigation, monitoring, etc.) resulting from the Project's different activities/ pathways, the ESIA Project Team concludes that if recommended mitigation and monitoring measures are followed, Rewilding Maforki Project can be operated without significant adverse impact to the environment and/or socio-economic conditions.

Thus, this ESIA study could be used by Rewilding Maforki and its pertinent stakeholders as a tool for decision-making and environmental management that will enable Rewilding Maforki to design

and implement the Project without compromising its technical and economic feasibility and help determine crucial elements that facilitate the making of choices and decisions.