Verified Carbon Standard

Document Prepared by South Pole Asset Management S.A.S

Project Title	**Reforestation of degraded lands in Sierra Leone**
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1 INTERNAL RISK

Project Management		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rating**
a)	*Species planted (where applicable) associated with more than 25% of the stocks on which GHG credits have previously been issued are not native or proven to be adapted to the same or similar agro-ecological zone(s) in which the project is located.* Currently, MFSL, the project proponent, has established 5,600.99 hectares in Sierra Leone, 65% of which will be of the species *Eucalyptus pellita*, *Eucalyptus urophyla*, *Eucalyptus* hibrid cross *urophilla* x g*randis* and the remaining 35% will be distributed between *Acacia mangium* (17%), *Gmelina arborea* (9%), *Corymba citriodora* (6%), , *Tectona grandis* (1%), and other species (3%) . *Eucalyptus pellita* is a native species to Australia and Papua New Guinea, and is listed as an exotic species in Brazil, Congo, Fiji, India, Indonesia, Kenya, South Africa, and Uruguay. *Eucalyptus urophyla* is a native species to Indonesia and Timor and is listed as an exotic species in Australia, Brazil, Cameroon, China, Congo, Côte d'Ivoire, French Guiana, Gabon, Madagascar, Malaysia, Papua New Guinea and Vietnam. *Acacia mangium* is native to the humid tropical forests of northeastern Australia, particularly the coastal tropical lowlands of northern Queensland, Papua New Guinea and into Irian Jaya and the Maluku Islands of Indonesia. *Corymbia citriodora* is a species of tall tree that is endemic to north-eastern Australia. *Gmelina arborea* is a native species to Bangladesh, Cambodia, China, India, Japan, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam, but is introduced as an exotic species to Brazil, Côte d'Ivoire, Ethiopia, Gambia, Ghana, Kenya, Malawi, Malaysia, Nigeria, Sierra Leone,Sudan, Tanzania, Uganda, Zambia. *Tectona grandis* is native to south and southeast Asia and is mainly found within Bangladesh, India, Indonesia, Malaysia, Myanmar, Thailand and Sri Lanka, however the species is naturalised and cultivated in many countries in Africa and the Caribbean.	0
b)	*Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50% of stocks on which GHG credits have previously been issued.* Not applicable to this project.	0
c)	*Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project*	0

	activities (i.e., any area of required experience is not covered by at least one individual with at least 5 years' experience in the area). The management team includes people with more than 5 years of experience in the area: ● **George Catterick:** General Manager. George has over 30 years' experience in commercial forestry in green field operations. His career path includes four years in saw timber plantations for the South African Forestry Department, over six years with Mondi Forests SA and from 1996 specialising in silviculture, land use planning, soils, delineation and civil engineering in forestry. George holds a Diploma in Forestry from Saasveld College, South Africa. ● **Eric Buedi:** Planning and Environment Manager. Eric specialises in ecology and geospatial analysis and has over 10 years of experience using remote sensing and GIS in mapping and managing natural resources. Prior to joining MFSL, Eric worked with over 1,000 cocoa farmers in Ghana mapping and conserving biodiversity. Eric holds a Master degree in Geoinformation Science for Environmental Modelling and Management and a BSc in Natural Resource Management. ● **Jariatu Conteh:** Assistant Forester Harvesting Department. Jariatu has a background in environmental sciences and joined MFSL company as an intern in 2015. She has 7 years of experience working in different capacities as Assistant Enviromental Officer, Assistant Forester (harvesting) and now as harvesting data analyst. She holds a BSc.in Environmental Management and Quality Control from Njala University.	
d)	*Management team does not maintain a presence in the country or is located more than a day of travel from the project site, considering all parcels or polygons in the project area.* MFSL is still wholly owned by MIRO Forestry Developments Limited (MFD), a sustainable plantation forestry development company incorporated in the UK but focused in West Africa, where it has a highly skilled management team present within the country.	0
e)	*Mitigation: Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (e.g., individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs.* The MFD management team engaged with a carbon project development team, South Pole, who has extensive technical expertise in developing projects in Agriculture, Forestry and Other Land Use (AFOLU), as well as in-depth knowledge of	-2

	national and international carbon markets[1]. More information about the project developer is available at www.southpole.com The management team responsible for managing this project within South Pole includes: ● **Jhoanata Bolivar Cardona:** Has more than ten years of experience designing and carrying out forest inventories and putting carbon monitoring programs in place. She oversees Nature Based Solutions globally from the South Pole. She has taken part in initiatives to prevent deforestation and degradation, A/R initiatives, NAMAs formulation initiatives, and feasibility studies for projects including efficient cookstoves. She has concentrated her scientific efforts on investigating the carbon dynamics in mangrove ecosystems. She has taken part in attempts to establish the baseline carbon stock in mangroves in order to put mitigation strategies for climate change into action (REDD). ● **Maria Fernanda Buitrago:** Specializes in forest‹3 management, conservation, and remote sensing. She's the Senior Manager for Afforestation, Reforestation, and Revegetation (ARR) projects at South Pole. Her expertise includes implementing AFOLU projects using VCS, CCB, and Gold Standard processes, tools, and guidelines. She has competence in biomass estimation, GHG quantification, eligibility, additionality, and risk analysis, impact assessment, and the creation of implementation and monitoring plans in AFOLU. She has more than 15 years of experience developing projects for private organizations and research institutes in the domain of forests and climate change, especially environmental assessment of forest ecosystems, forest conservation, and biodiversity assessment, from fieldwork to regional and national scales using GIS and remote sensing. ● **Lina Vanesa Espitia:** has more than 10 years of expertise as a forestry engineer in the AFOLU industry. She works for the AFOLU team at South Pole as the Project Development Manager. Her areas of competence are specifically in commercial plantations, field operations, and forest planning. She significantly contributed to the achievement of FSC accreditation for Forest Management in a business plantation. She has experience working both in the corporate sector and as an academic consultant. Her position at South Pole enables her to work with others to generate project papers, particularly for AR projects using a variety of approaches and standards.	
f)	***Mitigation**: Adaptive management plan in place*. MFSL has a forest management plan which is updated annually. The most recent version was published in 06/07/2022 and is still in force	-2

[1] See the support in the next route: NPRT/1_Internal risks/CV South Pole

	which contains: Management Systems, Planning, Silviculture, Forest protection, Forest roads, Harvesting, Infrastructure, Research, Management of natural areas, Social management, Monitoring, Evaluation and Auditing, Review and Updating Management Plans[2]. This is used as an indication of how, where, when and by whom plantation operations are performed.	
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)] Total may be less than zero.		**-4**

Financial Viability		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rating**
a)	*The project cash flow breakeven point is greater than 10 years from the current risk assessment.* Not applicable to this project.	0
b)	*Project cash flow breakeven point is greater than 7 and up to 10 years from the current risk assessment.* With the information provided by the Project Owner[3], it was identified that the project breaks even in the year 2031, i.e. year 9 from the current risk assessment. Revenues from the commercialization of VCUs with an average annual reduction of 51,574 tCO2e were estimated. The reference price for 2022 is $15. A project discount rate of 13% is assumed, the profit tax rate in Sierra Leone is 15% and the overhead cost inflation factor is 4%. In addition, revenue is considered from the sale of: Plywood, Poles, Teak and Biomass. Also included are the costs related to the preparation of the documentation to certify the emission reductions, corresponding to the audit (DOE), the support of the project developer in this process, standard fees and registration fees in the authorized platforms.	2
c)	*Project cash flow breakeven point greater than 4 and up to 7 years from the current risk assessment* Not applicable to this project.	0
d)	*Project cash flow breakeven point is 4 years or less from the current risk assessment* Not applicable to this project.	0

[2] See the support in the next route: NPRT/1_Internal_risks/MFSL FMP V12 2022

[3] See the support in the next route: NPRT/1_Internal risks/Financial Information/Sierra Leone Miro Group Financial Model Apr-2022 (MG Base)

e)	*Project has secured less than 15% of funding needed to cover the total cash out before the project reaches breakeven* Not applicable to this project.	0
f)	*Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches breakeven* Not applicable to this project.	0
g)	*Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven* Not applicable to this project.	0
h)	*Project has secured 80% or more of funding needed to cover the total cash out before the project reaches breakeven* According to available financial information, the project has obtained more than 100% of the necessary financing before reaching the break-even point[4].	0
i)	***Mitigation:*** *Project has available as callable financial resources at least 50% of total cash out before the project reaches breakeven* On 26/05/2020 MFSL signed agreements for US$48 million of new investment consisting of US$12 million each from CDC Group plc and Aqua Ventures FZE together with US$8 million each from the Finnish Fund for Industrial Cooperation Ltd, FMO and the Land Degradation Neutrality Fund SLP, in the form of redeemable preference shares. On the 14/01/2021 the Company signed an amendment to the Preference Shares subscription agreement for a further US$16 million of new investment consisting of US$12 million from FinDev Canada and a further US$4 million from the Land Degradation Neutrality Fund SLP, increasing the previous US48 million commitment to US$56 million whilst decreasing the existing commitments from CDC Group plc and Aqua Ventures FZE to US$8 million each[5]. These investment resources represent approximately 42% of the annual funding required.	0
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		**2**

0

Opportunity Cost

[4] See the support in the next route: NPRT/1_Internal risks/Financial Information/Sierra Leone Miro Group Financial Model Apr-2022 (MG Base)

[5] See the support in the next route: NPRT/1_Internal risks/Financial Information/MFD - Audited Consolidated Financial Statements (2021) v3

Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	*NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated* Not applicable to this project.	0
b)	*NPV from the most profitable alternative land use activity is expected to be between 50% and up to 100% more than from project activities* Not applicable to this project.	0
c)	*NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities* Not applicable to this project.	0
d)	*NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated* The MFSL Surveillance Audit Public Report from 2018 demonstrates the community impacts of MFSL and the project.[6] The report declares that MFSL represents the only "meaningful" source of employment within the region. Exploitation of wildlife resources within the region, prior to the project, provided the primary source of income (and protein). The diversification of income as a result of project activities is expected to improve upon this significantly and bolster livelihoods in a sustainable manner. The report also describes the financial risk related to the project as low. The company's budget is also prepared in consideration of both environmental and social costs of their operations. In addition, MFSL has a comprehensive training and supervision program for their forest workers. This is demonstrated through the uptake of induction training, skill improvement courses and educational qualification courses and their respective pre and post course evaluation by participants. MFSL supports managers and foresters in their requirement to have a tertiary education in forestry. MFSL also monitors production data from forestry supervisors on a daily basis through a cellphone app.	0
e)	*NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity*	0

[6] See the support in the next route: NPRT/1_Internal risks/ MFSL Surveillance Audit Public Report CoC 2018

	Not applicable to this project.	
f)	*NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity* Not applicable to this project.	0
g)	*Mitigation: Project proponent is a non-profit organization* Not applicable to this project.	0
h)	*Mitigation: Project is protected by legally binding commitment (see Section 0) to continue management practices that protect the credited carbon stocks over the length of the project crediting period* The project area is secured by land leases directly from the Government, the Chiefdom and individual landowners at 50 years guaranteed by the State under the country's existing legal framework[7].	-2
i)	*Mitigation: Project is protected by legally binding commitment (see Section 0) to continue management practices that protect the credited carbon stocks over at least 100 years* The project area is insured through 50-year leases with an option to renew for another 49 years under the current legal framework of the country (See section 3, item ix)[8]. *"3. The lessors hereby covenant with the lessee as follows:* *(ix) That the LESSORS will on the written request of the LESSEE made at least three (3) calendar months before the expiration of the term hereby granted and if there shall not at the time of such request be any breach of these covenants provisions and conditions hereinbefore contained on the part of the LESSEE grant to it a Lease of the DEMISED LAND for a further period of Twenty-one (21) years from the expiration of the said term with a further option to renew for another twenty-one (21) years and seven (7) years respectively all containing the like covenants provisions and conditions as are hereby contained with the exception of these present agreements for renewal PROVIDED that the rent for the option periods shall be negotiated and agreed upon between the parties subject to standard commercial terms."*	0
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g + h or i)] Total may be less than 0.		**-2**

[7] See the support in the next route: NPRT/1_Internal_risks/Longevity

[8] See the support in the next route: NPRT/1_Internal_risks/Longevity

Project Longevity		
a)	*Without legal agreement or requirement to continue the management practice* Not applicable to this project.	0
b)	*With legal agreement or requirement to continue the management practice* The project area is secured using 50-year leases. Land in Sierra Leone is communally owned and cannot be sold. The lease is state-guaranteed and the contracts were made under the current legal framework of the country[9].	4
Total Project Longevity (PL) May not be less than zero		**4**

Internal Risk	
Total Internal Risk (PM + FV + OC + PL) Total may not be less than zero.	**0.20**

2 EXTERNAL RISKS

Document and substantiate the risk and/or mitigation for each risk factor applicable to the project. Include any relevant documentary evidence. Where a risk or mitigation is not relevant to the project, please write "Not applicable".

Land Tenure and Resource Access/Impacts		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rating**
a)	*Ownership and resource access/use rights are held by same entity(s)* Not applicable for this project.	0
b)	*Ownership and resource access/use rights are held by different entity(s) (e.g., land is government owned and the project proponent holds a lease or concession)*	2

[9] See the support in the next route: NPRT/1_Internal_risks/Longevity

	Land in Sierra Leone is owned by the community and cannot be sold. But the project area is secured by land leases directly from the Government, the Chiefdom and individual landowners at 50 years guaranteed by the State under the country's existing legal framework with an option to renew for a further 50 years[10].	
c)	*In more than 5% of the project area, there exist disputes over land tenure or ownership* The project area is not in conflict with human settlement. All areas to be planted have been clearly demarcated in a meticulous way in order to avoid encroachment on human settlements. Communities are given advance notice before any afforestation program and MFSL only plants land that is allocated by the free will of the communities (See section 6 Livelihood Restoration)[11].	0
d)	*There exist disputes over access/use rights (or overlapping rights)* Like most rural communities in West Africa, all the communities are patriarchal and men own the property. Land and other resources are owned and controlled by men within the communities even though they are slightly in the minority in terms of population. All types of disputes within the company are referenced in the Environmental, Social and Governance ESG where quarterly reports are issued and these complaints are followed up. By 2019, six complaints were reported, one of which remains open and the others have been resolved through compensation and community dialogue. The complaints are primarily due to plantation burning by the MFSL team, the definition of land boundaries, and the fact that the Bonkabay community requested a meeting with MFSL's management regarding the terms and conditions of the land lease document and to make the document available to them. The document had not been distributed to the community. MFSL's CLOs visited the community and discussed the land lease and made a copy available, the community was satisfied with this and the application was closed[12].	5
e)	*WRC projects unable to demonstrate that potential upstream and sea impacts that could undermine issued credits in the next 10 years are irrelevant or expected to be insignificant, or that there is a plan in place for effectively mitigating such impacts.* Not applicable for this project.	0
f)	*Mitigation: Project area is protected by legally binding commitment (e.g., a conservation easement or protected area) to continue*	-2

[10] See the support in the next route: NPRT/ 1_Internals/ Longevity

[11] See the support in the next route: NPRT/ 1_Internal_risks/ MFSL Livlihood Study and Development Plan (14.08.06)

[12] See the support in the next route: NPRT/ 2_External_risks/ ESG Committee

	management practices that protect carbon stocks over the length of the project crediting period There is a legal agreement that corresponds to the 50-year lease, in which it is mentioned about the "Agricultural operations", but the execution is at the discretion of the tenant.	
g)	*Mitigation: Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims* The company has a Grievance mechanism for complaints, suggestions, and requirements. It contains a procedure for action when there are disputes over any issue, including land tenure. Within this mechanism, it is established that there must be support, investigations, forms, and tracking of the dispute from its beginning to its end. Documented evidence of the processes includes: Grievance Registry Form, Grievance Follow Up Form, Grievance Closure Letter, and Grievance Register[13].	-2
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e + f + g)] Total may not be less than zero.		**3**

Community Engagement		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rating**
a)	*Less than 50 percent of households living within the project area who are reliant on the project area, have been consulted* A study was done to establish a baseline with 8 communities within the project area (Livelihood study) [14]. All the communities are aware of the project, the field workers belong to the communities, there is a Grievance mechanism in place, through which the community can give their opinions (The procedures are documented in the Stakeholder engagement plan. Between 2021 and 2022, MFSL conducted mapping exercises with the communities impacted by the project. This mapping allowed MFSL to understand the priorities and concerns articulated by the local communities. It revealed the land tenure history, water source, health, education, employment, and priorities of the communities, among other factors. Many of the priorities agreed upon were commonalities among the villages, these include: ● Food security	0

[13] See the support in the next route: NPRT/ 2_External_risks/ Stakeholder Engagment _ Grievance Mechanism

[14] See the support in the next route: NPRT/ 1_Internal_risks/ MFSL Livlihood Study and Development Plan (14.08.06)

	● Water and sanitation ● Solar light ● Agriculture ● Education ● Road network ● Clinic ● Electricity Concerns presented among the communities include: ● Mamondor community: some women not approving of the decision to lease land to MFSL	
b)	*Less than 20 percent of households living within 20 km of the project boundary outside the project area, and who are reliant on the project area, have been consulted* Several public participation activities were carried out by the company as part of the company's land acquisition and Environmental and Social Risk Assessments. During the ESIA investigation, there was the consolation of stakeholders (2013 and thereafter) by third-party consultants. Meetings were held with the communities surrounding the leased land, which have since grown and there has been constant and ongoing communication with stakeholders regarding land agreements and employment, this is the responsibility of the Planning Manager, who also conducted a comprehensive livelihoods study in 2014[15].	0
c)	***Mitigation:*** *The project generates net positive impacts on the social and economic well-being of the local communities who derive livelihoods from the project area* The planting of MFC (SL) Ltd is necessary and will have a positive effect on the socio-economic situation of the area during its operations, some of these benefits are: Job Creation, Income from Land Lease Payments, MFSL Scholarship Scheme, health and medical aid scheme, Youth Development, Alternative Sources of Livelihood and Strategies to Increase Yield per Unit Area, Farmer Association and Extension Services, etc., (see section 7 Plan for Livelihood Development)[16]	-5
Total Community Engagement (CE) [where applicable, (a + b + c)] Total may be less than zero.		**-5**

Political Risk

[15] See the support in the next route: NPRT/ 2_External_risks/ MFC Stakeholder Engagment Plan 2015

[16] See the support in the next route: NPRT/ 1_Internal_risks/MFSL Livlihood Study and Development Plan (14.08.06)

Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	*Governance score of less than -0.79* Not applicable for this project.	0
b)	*Governance score of -0.79 to less than -0.32* The average (2016-2020 period) Worldwide Governance Indicators 2021 Update (World Bank)[17] score for Sierra Leone is -0.60[18].	4
c)	*Governance score of -0.32 to less than 0.19* Not applicable for this project.	0
d)	*Governance score of 0.19 to less than 0.82* Not applicable for this project.	0
e)	*Governance score of 0.82 or higher* Not applicable for this project.	0
f)	***Mitigation:** Country is implementing REDD+ Readiness or other activities, as set out in this Section 2.3.3.* Sierra Leone receives funding for REDD+ readiness from the FCPF, UN-REDD[19], or other bilateral or multilateral donors and is part of Non-Annex I which includes all non-Annex I[20] UNFCCC signatory Parties, including Brazil.	-2
Total Political (PC) [as applicable ((a, b, c, d or e) + f)] Total may not be less than zero.		**2**

External Risk	
Total External Risk (LT + CE + PC) Total may not be less than zero.	**0**

[17] The World Bank. (2020). Worldwide Governance Indicators 2019 Update. Retrieved from: https://datacatalog.worldbank.org/dataset/worldwide-governance-indicators

[18] See the support in the next route: NPRT/ 2_External_risks/ wgidataset

[19] See the support in the next route: NPRT/ 2_External_risks/ 2012 UN-REDD format

[20] See the support in the next route: NPRT_2020/ 2_External_risks/ cdm2009_SL

3 NATURAL RISKS

Explain the significance and likelihood of the natural risk and any mitigation activities implemented, (copy table for each natural risk).

Fire	
Significance	***Insignificant*** *(less than 5% loss of carbon stocks) or transient (full recovery of lost carbon stocks expected within 10 years of any event)* Given the long dry season in Sierra Leone and the fragmented nature of the plantations it would be expected that losses occurring due to fire damage would be high. However, annual losses are relatively low and are due in part to effective fire mitigation and prevention strategies.[21] MFSL 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. To date, the company has suffered minor losses as a result of fires and considers its fire management plan to be fit for purpose and effective (see section 4.1. Fire protection, MFSL Forestry Mgt Plan)[22]. The plan details the risks, mitigation strategies and individuals responsible for carrying out mitigation. It also communicates the role of the local communities in enacting the fire prevention mechanism. The risk areas identified within the plan are: ● Neighbors: the neighboring communities pose a risk as they sometimes practice burning without giving MFSL notice. ● Roads: heavy traffic and the risk of people throwing cigarettes out of their car windows while driving on main roads or pathways
Likelihood	***Less than every 10 years*** Sierra Leone in West Africa has a frequent incidence of forest fires as it is located in a rainforest climate region with numerous thunderstorms, which contributes to the frequent incidence of forest fires, but simultaneously, the abundant rainfall helps to keep the spread of forest fires under control[23] According to the results obtained from the (World Bank, 2020) natural risk analysis tool "Think Hazard", the danger of forest fire is classified as high. This means that there is more than a 50% probability that

[21] Technical review of plantation assets: forest inventory and woodflows.

[22] See the support in the next route: NPRT/1_Internal_risks/MFSL FMP V12 2022

[23] Meng, Y., Deng, Y., & Shi, P. (2015). Mapping Forest Wildfire Risk of the World. Retrieved from Shi P., Kasperson R. (eds) World Atlas of Natural Disaster Risk: DOI 10.1007/978-3-662-45430-5_14

	favorable weather conditions will exist for a major forest fire to occur that could cause loss of life and property in a given year[24]. Analysis shows that annual losses since 2018 have been declining and are under 40 hectares per annum, corresponding to less than 0.4% of the plantation estate.[25] Beyond the project area, of the over 8000ha of trees MFSL has planted across the Port Loko and Tonkolili Districts, losses of 118ha in 2019, 75ha in 2021 and 63ha in 2022 have been recorded. Community engagement and involvement of key stakeholders have been recognised as the reasons for the declining loss rate. In any case, this represents less than 5% of carbon stock losses.[26]
Score (LS)	2
Mitigation	Fire preparedness is of high importance during the fire season (December – April). MFSL has acquired equipment to manage fire outbreaks. Two firefighting machines and one tank have been purchased to date. Firefighting staff and tools are already in place and fully functional. Also, The company has introduced a fire index system that takes temperature, wind speed, and humidity into account and all staff will be alerted every morning as to the current index and the fire risk for the day. Refer to the Fire Management Plan for further details[27].

Pest and Disease outbreaks	
Significance	***Major (25% to less than 50% loss of carbon stocks)*** Currently *Leptocybe invasa*, and *halopensis* poses a threat to susceptible spp' such as *E.tereticornis*, *E.grandis* and seed selection is focused on species which will perform well for our climatic conditions as well as resistance to *L. invasa.* The other major pest is termites which prohibit the successful planting of Eucalyptus and Corymbia species. The impact of pests and disease vary, but can lead to reduced growth rates, reduced yields, lower quality timber and total crop failure – all of which have a significant financial impact (see section 4.2. Pest Control, MFSL Forestry Mgt Plan)[28]. From related literature, at least one major pest outbreak has been recorded in a natural forest stand in the humid forest zone. In late 2009 to 2010, an outbreak of *Achaea catacoloides* (*Lepidoptera: Erebidae*)

[24] See the support in the next route: NPRT_2020/ 3_Natural_risks/ ThinkHazard - Sierra Leone

[25] Technical Review of Plantation Assets: Forest Inventory and Woodflows

[26] FIRE MANAGEMENT PLAN 2022

[27] See the support in the next route: NPRT_2020/ 3_Natural_risks/ Miro Fire Action Plan

[28] See the support in the next route: NPRT_2020/ 3_Natural_risks/ MFSL Forestry Mgt Plan V8 FINAL 2019

	occurred in Liberia, Sierra Leone and Guinea, with devastating environmental and socioeconomic effects on forests and agriculture. Also, In Sierra Leone, dieback incidence was very high with infection rates up to 40% in plantations[29].
Likelihood	***Less than every 10 years*** According to FAO's disturbance statistics report on disturbances affecting forests and another wooded land in Sierra Leone during the period 1990 to 2000, there is no evidence of disturbance by insects, pests or diseases[30]. However, towards the end of 2009-2010 there was an outbreak of *Achaea catacoloides* (Lepidoptera: Erebidae) in Sierra Leone, with devastating environmental and socio-economic effects (African Forest Forum, 2017).
Score (LS)	10
Mitigation	The Company actively employs a range of preventative and control methods to combat pests and disease. Within the nursery, the Company aims to keep conditions as sanitary as possible to ensure that the planting stock is free of pests and disease. Refer to the Pest Control procedure for further details[31].

Extreme Weather	
Significance	***Minor (5% to less than 25% loss of carbon stocks)*** In recent years, flooding during the wet season has been frequent and severe. The 2017 floods caused deaths, displacement, and losses of livestock and crops throughout the region. Higher temperatures, reduced rainfall and a higher proportion of precipitation during heavy rainfall episodes threaten to exacerbate drought conditions (USAID, 2018)[32]. The flooding effects are considered minor for the forest (and the carbon stocks) because most of the harmful effects affect the urban (and rural) areas, mainly livestock, and cropland land-uses areas33. In fact, the forest (and its sustainable management) in Sierra Leone serves as a platform for natural disaster prevention such as flooding[34].

[29] African Forest Forum. (2017). The status and trends of forest and tree pests and diseases management in Africa. Retrieved from https://afforum.org/oldaff/sites/default/files/English/English_102.pdf

[30] See http://www.fao.org/forestry/country/32267/en/sle/

[31] See the support in the next route: NPRT_2020/ 3_Natural_risks/ Pest and disease SL

[32] USAID. (2018, 12). CLIMATE RISK PROFILE WEST AFRICA. Retrieved from https://www.climatelinks.org/sites/default/files/asset/document/West_Africa_CRP_Final.pdf

[33] Stated in the NPRT report: NPRT/NPRT_Miro_SL.docx

[34] Sam, M., & Zhiqiang, Z. (2018). The trend of forest cover removal: Case study of Tonkolili district, Northern Sierra Leone. *Journal of Environment and Earth Science*, 8(11).

Likelihood	***Less than every 10 years*** According to the results obtained from the (World Bank, 2022) natural risk analysis tool "Think Hazard"[35] the probability of the occurrence of extreme events in Sierra Leone is: ● **River, urban or coastal flooding**[36] **(High):** The danger of river, urban and coastal flooding is classified as frequent according to the modeled flood information available in this tool. This means that potentially harmful and deadly river, urban and coastal floods are expected to occur at least once in the next 10 years.
Score (LS)	5
Mitigation	Not applicable for this project.

Geological Risk	
Significance	***No Loss*** There is no risk of losses due to geological forces in the project area. This is confirmed by the United States Geological Survey (USGS)[37].
Likelihood	***Every 25 to less than 50 years***[38] ● **Earthquake (Low):** The earthquake hazard is classified as low according to the information currently available. This means that there is a 2% chance that a potentially damaging earthquake will occur in your project area in the next 50 years. ● **Tsunami (Low):** The tsunami danger is classified as low according to the information currently available. This means that there is more than a 2% probability that a potentially damaging tsunami will occur in the next 50 years.
Score (LS)	0
Mitigation	Not applicable to this project.

[35] World Bank. (2022). República Democrática del Congo. Retrieved From: https://thinkhazard.org/en/report/221-sierra-leone

[36] See the support in the next route: NPRT_2020/ 3_Natural_risks/ ThinkHazard - Sierra Leone

[37] United States Geological Survey. (2020). Retrieved from: http://earthquake.usgs.gov/earthquakes/world/africa/gshap.php y http://earthquake.usgs.gov/earthquakes/world/africa/seismicity.php.

[38] See the support in the next route: NPRT_2020/ 3_Natural_risks/ ThinkHazard - Sierra Leone

Score for each natural risk applicable to the project (Determined by (LS × M)	
Fire (F)	1
Pest and Disease Outbreaks (PD)	10
Extreme Weather (W)	5
Geological Risk (G)	0
Other natural risk (ON)	0
Total Natural Risk (as applicable, F + PD + W + G + ON)	16

4 OVERALL NON-PERMANENCE RISK RATING AND BUFFER DETERMINATION

4.1 Overall Risk Rating

Risk Category	Rating
Internal Risk	0.20
External Risk	0
Natural Risk	16
Overall Risk Rating (a + b + c)	**17**

4.2 Calculation of Total VCUs

In the table below the summarized figures of the net reductions for the first monitoring period, corresponding to 16/05/2016 to 10/01/2020 and the second monitoring period, corresponding to 11/01/2020-20/09/2022 are presented respectively

Plantation Year	Stratum	C Tree (tCO2e)/stratum)	SOC (tCO2e)/stratum)	Cdw (tCO2e)/stratum)	CLi (tCO2e)/stratum)	Total Cabon second verification (tCO2e/strata)	Total Cabon first verification (tCO2e/strata)	Leakage (ton/strata)	Total Cabon second-verification (tCO2e/strata)	Buffer (17%) (tCO2e)	Net carbon/strata-Buffer 17% NPRT (tCO2e)
2016	1.1	44039	382	2642	440	47504	46053	572	879	149	730
2016	1.2	14102	124	846	141	15213	2341	178	12695	2158	10537
2016	1.3	98787	526	5927	988	106228	21864	768	83596	14211	69385
2016	1.4	3882	42	233	39	4196	2883	61	1252	213	1040
2016	1.6	1253	25	75	13	1366	812	36	519	88	430
2017	2.1	18222	200	1093	182	19697	8895	374	10428	1773	8655
2017	2.2	9128	81	548	91	9848	1926	144	7778	1322	6455
2017	2.3	74798	825	4488	748	80859	9128	1475	70256	11943	58312
2017	2.4	35478	203	2129	355	38164	15264	355	22545	3833	18712
2017	2.5	245	32	15	2	294	185	54	54	9	45
2017	2.6	629	23	38	6	697	478	43	175	30	145
2018	3.1	13251	109	795	133	14287	6524	247	7516	1278	6238
2018	3.2	10825	140	649	108	11723	3587	315	7820	1329	6491
2018	3.3	123674	1320	7420	1237	133651	30472	2877	100301	17051	83250
2018	3.4	13810	79	829	138	14856	5019	168	9668	1644	8025
2018	3.5	61	5	4	1	70	20	11	40	7	33
2018	3.6	3695	73	222	37	4027	471	156	3400	578	2822

2019	4.1	31362	180	1882	314	33737	0	676	33061	5620	27441
2019	4.2	40005	678	2400	400	43483	0	2096	41387	7036	34351
2019	4.3	13539	108	812	135	14595	0	379	14216	2417	11799
2019	4.4	1826	17	110	18	1971	0	69	1902	323	1579
		552611	**5173**	**33157**	**5526**	**596466**	**155923**	**11055**	**429488**	**73014**	**356474**