



**Verified Carbon
Standard**

VALIDATION REPORT BANDAI HILLS BAMBOO REFORESTATION PROJECT, GHANA



Document prepared by TÜV NORD CERT GmbH

Project Title	Bandai Hills Bamboo Reforestation Project, Ghana
Version	1.3
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Report Title	Validation Report Bandai Hills Bamboo Reforestation Project, Ghana
Client	EcoPlanet Bamboo Group
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Summary:

Description of validation and project: The “Bandai Hills Bamboo Reforestation Project, Ghana” is a reforestation project located in the Ashanti Region in Ghana/West Africa. The proposed project activity is carried out by “EcoPlanet Bamboo, West Africa” and is designed as a grouped project. It contains the reforestation of about 3500 ha of the heavily degraded Forest Reserve “Bandai Hills” with different species of clumping woody bamboo with the specific purpose of increasing the carbon stock and associated GHG emission removals. Existing patches of remaining forests, solitary trees and native vegetation are left untouched, and bamboo is interplanted only on areas that are proven non forest for at least 10 years prior to project start. The total eligible project area is 7372 ha. The proposed project activity started with planting activities in June 2021 with the beginning of the rainy season. Planting will continue for 4 years. The project is designed as a group project. The project represents an initial total potential GHG emission removal of 3,778,511 tCO₂e resulting in an average annual GHG emission removal of 188,926 tCO₂e over the 20 year project crediting period.

Purpose and scope: The validation objective is an independent assessment by a Third Party of a proposed project activity against all defined criteria set for the registration under the under VCS, Scope 14 “Agriculture, Forestry, and other Land Use (AFOLU).

In order to confirm that the project activity, as documented, is sound, reasonable and meets the identified criteria, the validation involves the assessment of project conformance to VCS rules, project conformance to the applied methodology, including the procedure for the demonstration of additionality specified in the methodology; and likelihood that methods and procedures set out in the project description will generate verifiable GHG data and information when implemented. Validation is a requirement and is seen as necessary to provide assurance to stakeholders of the quality of project and its intended generation of VCU. Validation is part of the VCS project cycle and will finally result in a conclusion by the executing VVB whether a project activity is valid to be submitted

for registration to VCS registry. The ultimate decision on the registration of a proposed project activity rests with the VCS/Verra.

Method and criteria: The Validation is conducted using TÜV NORD CERT GmbH procedures in line with the requirements specified in the latest version of the VCS Validation and Verification Manual and applying standard auditing techniques. The validation team assessed the proposed project activity's compliance under the VCS Version 4.3, VCS Program Guide Version 4.1, AFOLU Non-Permanence Risk Tool Version 4.1, Methodology AR-ACM0003 version 2.0.0 – “Afforestation and reforestation of lands except wetlands”. The members of the audit team carry out the desk review based on the initial PD, follow-up actions, onsite visit, resolution of issues identified and finally preparation of the validation report. The prepared validation report and other supporting documents then undergo an internal quality control by the Certification Body “TÜV NORD CERT GmbH”, before final submission of the validation report.

Number of findings: In the course of the VCS Verification, 8 Clarification request (CL) and 2 Correction Action Requests (CAR) were raised and successfully closed. **2 Forward Action Requests (FAR)** has been raised.

Uncertainties: There are no restrictions of uncertainty.

Summary of the validation conclusion EcoPlanet Bamboo Group has commissioned the TÜV NORD JI/CDM Certification Program as Third-Party a to carry out an independent assessment (Validation) of the “Bandai Hills Bamboo Reforestation Project, Ghana” against the requirements of VCS Version 4.3.

The review of the project documentation, the observations made during the onsite visit and the subsequent follow-up interviews have provided TÜV NORD with sufficient evidence to determine the fulfilment of all stated criteria. In our opinion, the “Bandai Hills Bamboo Reforestation Project, Ghana” has demonstrated positive conformance to the VCS Version 4.3. The GHG assertion provided by the EcoPlanet Bamboo Group and validated by TÜV NORD will result in the expected GHG emission removal of 3,778,511 tCO₂e on 1,750,000 bamboo clumps over the 20 years crediting period Equivalent to an **average annual GHG emission removal of 188,926 tCO₂e**.

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1 INTRODUCTION

1.1 Objective

The purpose of the validation audit was to conduct an independent assessment of the project in order to determine whether the project complies with the validation criteria, as set out in the guidance documents listed in Section 1.2 of this report.

EcoPlanet Bamboo Group, LLC has commissioned the TÜV NORD JI/CDM Certification Program to carry out the Validation of the project “Bandai Hills Bamboo Reforestation Project, Ghana”.

The objectives of this audit included a validation of the projects calculated emission reductions with the Verified Carbon Standard requirements and any additional requirements of VCS AFOLU projects, besides the assessment of the baseline, the additionality and the risk assessment report.

1.2 Scope and Criteria

Validation Scope: The scope of the validation is to validate the emissions reductions of the proposed project activity in Ghana against the Verified Carbon Standard, the identified methodology and associated tools, for the crediting period from 01/06/2021 to 31/05/2041. The validation is based on the project design document^{/01/}, the Non-Permanence Risk Report, ^{/02/}, supporting documents made available and information collected through performing interviews and during the on-site assessment. Furthermore, publicly available information was considered as far as available and required.

Validation Criteria: In accordance with Section 4.1.8 of the VCS Standard, the criterion for validation was the VCS Version 4, including the following documents:

- VCS Standard v4.3
- VCS Program Guide v4.1
- VCS AFOLU Non-Permanence Risk Tool2v 4.0
- AR-ACM0003: Afforestation and reforestation of lands except wetlands”, Version 02.0

Unless otherwise indicated, the assessment was performed against the most recent version of the relevant VCS documents.

1.3 Level of Assurance

The validation has been planned and organized to achieve a

- ☒ reasonable level of assurance
- ☐ limited level of assurance

of conformance against the defined audit criteria and materiality thresholds within the audit scope. Based on the audit findings, a positive evaluation statement reasonably assures that the project GHG assertions are materially correct and is a fair representation of the GHG data and information.

Validation Report: VCS Version 4.0

1.4 Summary Description of the Project

The project proponent, EcoPlanet Bamboo Group, LLC (“EcoPlanet”) is one of the leading companies in the development of bamboo plantations. It has about 10 years of experience in research, cultivation and plantation establishment of bamboo.

The “Bandai Hills Bamboo Reforestation Project, Ghana” aims to reforest degraded areas of the Bandai Hills Forest Reserve in the Ashanti region of Ghana with different species of giant bamboo, *Bambusa textilis* and *Dendrocalamus asper*. The Bandai Hills Forest Reserve is a Forest Reserve according to Ghanaian Law. The land is owned by the stool but under complete administration and management of the Forestry Commission (FC). EcoPlanet has a 50 year lease agreement with the FC that covers full rights for about 3,340 ha of degraded area within the Forestry Reserve /05/. The total number of clumps to be planted is 1,750,000 with a spacing of four by five metres. This will result in a calculated area of 3500 ha of bamboo plantation. The difference will not part of the proposed Project Activity. The planting will be executed on those areas of the forest reserves that have been deforested at least 10 years ago. Relict patterns of existing forest, areas that have been deforested less than 10 years ago, solitary trees and other types of existing woody vegetation will be left untouched. The bamboo will be interplanted with the target to reach a forest cover without damaging the existing native tree vegetation.

Seedlings are raised in the nurseries of the Forest Research Institute of Ghana FORIG and transported to the planting sites with the onset of the rains each year. Land preparation and all associated management activities are carried out manually.

2 VALIDATION PROCESS

2.1 Method and Criteria

The validation was performed through a combination of desk review of initially provided documents, an onsite visit to the Project owners local head office including detailed document check, field inspections of the project area and plating sites and interviews with relevant personnel and stakeholders. At all times, the project was assessed for conformance to the

criteria described in Section 1.2 of this report. As discussed in Section 2.5, findings were issued to ensure that the project was in full conformance to all requirements.

The validation of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the VCS project description
- A desk review of the VCS project description submitted by the client and additional supporting documents with the use of customised validation protocol
- Validation planning
- On-Site assessment
- Background investigation and follow-up interviews with personnel of the project developer and its contractors
- Draft validation and verification reporting
- Resolution of corrective actions
- Final validation and verification reporting
- Technical review
- Final approval of the validation and verification.

The sequence of the validation is given in the table 2.2 below:

▪ **Table 2.1:** Validation/Verification sequence

Topic	Date
Assignment of validation	13/12/2021
Onsite-Audit, field visits and Interviews	26/04/2022 till 29/04/2022
Draft reporting finalized	24/08/2022
Final reporting finalized	10/11/2022
Final reporting after accuracy review, round 1	26/04/2023
Final reporting after accuracy review, round 2	15/09/2023
Final reporting after PRR, round 3	27/02/2024

Appointment of team members and technical reviewer

Based on a competence analysis and individual availabilities, a verification team was appointed. Furthermore, also the personnel for the technical review and the final approval were determined.

The team leader has next to a long-term experience as a forest carbon auditor a host country expertise as he worked in a management position in the forestry sector in the project region for several years.

The list of involved personnel, the tasks assigned, and the qualification status are summarized in the table 2.2 below.

Table 2.2: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme Competence ³⁾	Technical Competence ⁴⁾	Verification Competence ⁵⁾	Host country Competence	Remote audit
☒ Mr. ☐ Ms.	Martin Seitz	ETE	TL ^{A)}	LA	☒	14.1	☒	☒	-
☐ Mr. ☒ Ms.	Alexandra Nuske	TN CERT	FA/ TR ^{B)}	SA	☒	14.1	☒	☐	-

¹⁾ TL: Team Leader; TM: Team Member^{A)}; TR: Technical review^{B)}; OT: Observer-Team^{B)}; OR: Observer-TR^{B)}; FA: Final approval^{B)}

^{A)} Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE

^{B)} No team member: OT, TR, OR, FA

²⁾ GHG Auditor Status: A: Assessor; LA: Lead Assessor; SA: Senior Assessor; T: Trainee; TE: Technical Expert

³⁾ GHG auditor status (at least Assessor)

⁴⁾ Technical Area / TR Subcategory as per S01-VA000-F02 or S01-VA070-F01 (such as 1.1, 1.2, ...)

⁵⁾ In case of verification projects

2.2 Document Review

The Project Description Document submitted by the Project Proponent (PP) was reviewed against the approved methodology and against VCS requirements. Additional background documents related to the project design, baseline and additionality were also made available before and during the audit, along with the non-permanence risk report.

Furthermore, the validation team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

The references used in the course of this validation are summarized in Appendix 2.

The validation was performed based on the document check and site inspection. Refer to section 3 of this report for the validation process in detail and corresponding documents review.

To address the corrective actions and clarification requests that arose from the audit, the PP revised the project description document version 1 and developed a final version 1.4, dated.

2.3 Interviews

The validation/verification team has carried out interviews to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS.

Representatives of the PP, governmental authorities of different levels, consultants, service providers and other parties including the operational staff and workers of the plantation and members of a community adjacent to the plantation area have been interviewed.

The interviews served to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in Table 2-3. A full set of interviewed persons can be found in **Appendix IV**. The attendance register including all names and signatures is available^{/10/} but not included due to privacy concerns. The attendance register can be made available to Verra upon request.

Table 2.3: Interviewed groups of persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives	- Chronological description of the project activity with documents of key steps of the implementation.
Governmental authorities	- Technical details of the project realization, project feasibility, designing, operational lifetime, monitoring of the project
Service providers	- Financial aspects
Employees and workers	- Crediting period
Community members	- Project activity starting date
	- Ownership, Title deed,
	- Baseline study assumptions
	- Additionality
	- Monitoring
	- Analysis of local stakeholder consultation
	- Roles & responsibilities of the project participants w.r.t. project management, monitoring and reporting
	- Editorial issues of the VCS PD
	- Environmental aspects
	- Social-economic aspects

2.4 Site Inspections

As most essential part of the validation/verification exercise, it is indispensable to carry out an inspection on site in order to verify that the project design is in accordance with the applicable standard criteria.

Between 26 April and 29 April 2022, TÜV North performed a physical site inspection to confirm relevant information and to resolve issues identified in the first document review. The audit team documented the results from the onsite visit in respective field data notes^{10/}.

The auditor visited the project area and randomly selected a variety of samples for verification of the description provided in the PD, the Non-Permanence Risk Report, the forest cover map, the shape files and other supporting documentation. 8 out of 61 compartments were visited.

Next to the planting sites the new head office in Agogo, the nurseries and research sites at the Forest research Institute of Ghana (FORIG) in Kumasi, the workers camp in the project area well as the nearby village of Mankala were visited.

In Addition, the audit team visited the following state forestry authorities for interviews:

- Headquarter of Forestry Commission, Accra
- Forestry Service Division Office, Juaso
- Forest Research Institute of Ghana, Kumasi

The main tasks covered during the site visit include, but are not limited to:

- the verification of the project boundary
- the verification of ownership of the land
- the verification of the eligibility of the lands,
- the verification of the baseline land use, carbon stocks and land cover
- the verification of the leakage situation
- the verification of planting year, number of plants, species composition, growth and survival rate, protection measures and maintenance
- the verification of documentation and monitoring procedures
- the verification of consideration of labour rights and contracts
- validation of the information processes for generating, aggregating and reporting the selected monitored parameters
- validation of the monitoring processes, routines and documentations
- interviews of the operating staff and observation of appropriate operation and data collection procedures as well as risk of accidents/health and safety issues
- Interviews of smallholder farmers/community members in order to check the risks of displacement/livelihoods/access to ecosystem services/knowledge of the project activity, benefits, etc.

2.5 Resolution of Findings

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence on the project results,

- the requirements deemed relevant for verification of the project with certain characteristics have not been met, or
- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the next verification. A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in Section 4 of this report.

In the course of the VCS validation, 08 Clarifications request (CL) and 02 Correction Action Requests (CAR) were raised and successfully closed. 01 Forward Action Requests (FAR) has been raised. In accordance with Sections 4.1.13 and 4.1.14 of the VCS Standard v4.3, all CARs and CLs issued during the validation process, and the inputs for their closure, are described in Appendix 2 of this report.

2.5.1 Forward Action Requests

Two Forward Action Requests was raised to the PPs during this process.

Finding:	FAR 01		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding Describe the finding in unambiguous style; address the context (e.g. section)	The PP uses the following system of calculation of the area planted: The PP intends to plant 1.000.000 bamboo seedlings. The calculated space of each planted Bamboo clump is 20 m² (4m x 5m spacing). This indicates that 500 plants are planted on 1 ha. Due to the circumstance that there are existing solitary trees, rocky areas, small groups of trees etc. where planting of seedlings is not executed, 1 ha will, in many cases, include rather less than the 500 plants. The calculation of the area planted will therefore be based on the number of clumps planted rather than on the actual area size. This means, that on the available area of abt. 7372 ha, a calculated area of 3500 ha will be planted. Hence, the base for the carbon inventory is rather the number of plants than the actual area. The PP uses a specific forestry software which is presently under development to document the exact number of clumps planted, its survival status etc. At verification the audit team will have to verify the actual number of existing clumps by a sampling approach. At validation there was no detailed description, how this will be achieved. The PP needs to bear in		

Finding:	FAR 01
	mind, that the inventory as base of the carbon calculation needs to be verifiable.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Validation Report: VCS Version 4.0
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Finding:	FAR 02		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	As literature on allometric equations on the specific bamboo species is sparse and not sufficiently reliable to compare with the project conditions, the PP developed a species specific allometric equation for the ex-ante estimation. To ensure accurateness and conservativeness the developed allometric equations is subject to re-assessed and verification at 1 st verification.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>			
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>			
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

3 VALIDATION FINDINGS

Validation Report: VCS Version 4.0

3.1 Project Details

3.1.1 Project type

The project is classified under sectoral scope 14 “Agriculture, Forestry and Land Use (AFOLU)”. As described in Section A1.1 of the VCS Standard, the project is eligible under the category of Afforestation, Reforestation, and Revegetation (ARR).

The project includes the direct planting of 2 clumping species of bamboo in the degraded forest reserve of Bandai Hills. Areas with remaining patches of forests are excluded from planting areas.

The project has been identified as being a reforestation project as the area where the planting takes place has not been forest for the last 10 years and the Bamboo will form a forest according to the Ghanaian forestry definition^{/37/08/}.

3.1.2 Project design

The proposed project is designed as a VCS grouped project

Eligibility criteria for the inclusion of new smallholder farmers are described in the PD and found in line with the standard 3.5.15.

The core aspects are:

- No inclusion of wetlands
- No soil disturbances > 10%
- One baseline scenario is identified for all project activity instances.
- Same technology for land preparation, planting, maintenance and monitoring
- Same species of sympodial bamboo (*Bambusa textilis*, *Dendrocalamus asper*)
- All future Project activity instances face same barriers in regard to additionality

See CL 1, CAR2.

3.1.3 Project proponent

Project proponent: EcoPlanet Bamboo Group, LLC

Other entities involved:

EcoPlanet Bamboo WA II, LLC, wholly owned subsidiary of EcoPlanet Bamboo Group, LLC which holds the long term lease to the project area.

The audit team confirms entity information provided in the PD is in conformity to the VCS requirements.

3.1.4 Ownership

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The Project Proponent EcoPlanet Bamboo Group, LLC holds via its wholly owned subsidiary EcoPlanet Bamboo WA I^{/13/}, LLC a 50 year land lease agreement with the Forestry Commission for Public-Private Partnership with respect to the development of a commercial bamboo plantation in the Bandai Hills Forest Reserve. According to Ghanaian law, “The lands that have been constituted as forest reserves are vested in the President in trust for the stool concerned by virtue of section 16(1) and (2) of the Concessions Act, 1962 (Act 124)^{/19/}; The Forestry Commission is charged with, among other things, the management of the country’s forest reserves and protected areas^{/20/} and the development of forest plantations for the restoration of degraded forest areas. The lease covers an area of 7,804.56 ha ^{/05/}. Due to some inconsistencies in the original forest cover maps in connection with the lease from the adjacent North Bandai Forest Reserve, this was corrected to 7,818 ha. The corresponding information has been verified by document review and interview with the Ghana Forestry Commission ^{/10/15/16/17/}.

TÜV Nord confirms the ownership as described above. The conclusion is based on the review of information and documents provided by the PP and verified by interviews with representatives of the Forestry Commission in the headquarter in Accra and the Forestry Services Division Office, Juaso^{/10/}.

See CL 2.

3.1.5 Project start date

The project start date is 01/06/2022, which corresponds to the date of the first planting^{/12/}.

3.1.6 Project Crediting Period

The proposed project crediting period is 20 years and is a fixed crediting period.

Project start date: 01/06/2022

Project end date: 31/05/2042

3.1.7 Project Scale and Estimated GHG Emission Reductions or Removals

The project is classified as “project” according to its scale (less than or equal to 300,000 tonnes of CO₂e per year) since it will remove an estimated average of 188,926 tCO₂e per year and a total of 3,778,511 tCO₂e during the 20 years of crediting period^{/01/04/}

3.1.8 Project location

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The project is located in the Ashanti Region in Ghana, West Africa. The location is described in the PD^{/01/}. KML files of the project location have been provided^{/03/}. Project area eligible for planting bamboo and accounting for VERs is clearly defined but differs slightly from common practice in A/R projects. The carbon accounting will be executed on individual clump base and as a second step the project area will be calculated on base of the standing area if a clump (5m x 5m = 25 m). Forest cover maps dated 2012^{/07/} show the area excluded/non eligible. The outer boundary is the boundary of the forest reserve. Hence, roads, camps, rocky areas etc. will not be part the project area at verification.

See FAR 1.

The provided data has been crosschecked via comparison analysis with public available satellite images^{/37/} and verified during the field inspection doublecheck with collected GPS data^{/12/21/}.

3.1.9 Conditions prior to project initiation

Regarding conditions prior to the project initiation, the PD describes in a complete way the climate, hydrology, topography, relevant historic conditions, soils, vegetation and ecosystems for the areas involved in the project.

The bamboo is planted inside a heavily degraded forest reserve. This is described in detail in the PD and has been verified by the audit team during the on-site visit by document review, field inspection and interviews conducted^{/09/10/}.

Further information on the assessment of eligibility of lands is presented in section 3.3.3 of this report.

3.1.10 Compliance with Laws, Statutes and Other Regulatory Frameworks

Section 1.14 of the PD provides information related the compliance with the applicable laws, statutes and other regulatory frameworks. The main and relevant nation Laws international legislation are described, and their enforcement analysed in appendix 1 of the PD. According to the information provided and assessed during the audit, the project fulfils the laws mentioned in the PD. This has been verified by interviews with representatives of the Forestry Commission

in the headquarter in Accra and the Forestry Services Division Office, Juaso^{10/}. Thus, TÜV Nord considers that project complies with applicable laws, statues, and other regulatory frameworks.

3.1.11 Participation under other GHG programs

The project is not registered or seeking registration under any other GHG program.

The project has not been rejected by another GHG program.

The audit team confirms compliance with the standard requirements /APPENDIX III/.

3.1.12 Other forms of credit

The emission removals resulting from the project are not included in any emissions trading program or similar mechanism. The PP holds the explicit carbon rights as agreed with the Ghana Forestry Commission /6a/.

The project has not sought nor received another form of GHG-related environmental credit and is not eligible to participate in any such program.

The audit team confirms compliance with the standard requirements by document review^{05/06/6a/} and interview with Thomas Gyambrab, Climate Change Directorate – Ghana Forestry Commission/ Manager Programs and MRV /APPENDIX III/.

3.1.13 Sustainable development contributions

The Project activity contributes directly to 3 of 5 main goals of the “The Long–Term National Development Plan of Ghana (LTNDP):

1. Build an industrialized, inclusive, and resilient economy
2. Create an equitable, healthy, and prosperous society
3. Build well-planned and safe communities while protecting the national environment

The PD explains how project activities will result in expected SD contribution. There is no requirement for provisions for monitoring and reporting same.

Furthermore, the project activities positively contributing to achieving the following Sustainable Development Goals:

1: No poverty, 6: Clean water and sanitation, 8: Decent work and economic growth, 13: Climate action, 15: Life on land

Further Information:

EcoPlanet reports annually on its contribution to these aspects as part of its United Nation's Global Compact.

Thus, the audit team confirms compliance with the standard requirements under consideration of observations made at the onsite visit, documents reviewed, field inspections and interviews conducted^{/09/10/}.

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3.1.14 Additional information relevant to the project

Leakage management for AFOLU projects:

According to the applicable methodology only leakage due to the displacement of agricultural activities shall be considered. The project does not displace pre-project agricultural activities. Thus, neither a leakage management plan nor leakage mitigation measures are required.

Commercially sensitive information:

Commercially sensitive information surrounding the financing arrangements of the project have been excluded from the PD and the associated Non Permanence Risk Assessment. The audit team had access to all documents during the onsite visit. Confidential documents are:

- Addendum to the Benefit Sharing Agreement; November 10th, 2021^{/06a/}
- VER Purchase Agreement, Bandai Hills Bamboo Reforestation Project; September 29th, 2021.

See CL 04.

Conclusion:

TÜV Nord assessed the project details as described above through the review of the project design document, supporting evidence provided as well as field inspections and interviews conducted during the onsite visit. TÜV Nord confirms the accurateness and completeness of the provided project description.

3.2 Safeguards

3.2.1 No Net Harm

The project is utilizing non-native species of clumping (sympodial) bamboo to restore and reconnect remnant forest patches, while conserving all remaining standing trees. The Forestry authorities are aware of the project activity and support it. Seedlings are for example raised at the Forest Research Institute of Ghana. No negative environmental or socio-economic impacts due to the project activity are described. On the contrary, in terms of ecological aspects, the most important benefits described are:

- Protection of any remaining trees and forest patches at the start of the project activity;
- Restoration of degraded soils;
- Regeneration of additional ecosystem services, including healthy soils, water and biodiversity;
- Reduced risk of fire;

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Increased economic activity are described to result in significantly improved standards of living for the few fringe communities through the following avenues:

- Creation of livelihood opportunities
- Empowerment of women
- Sustainable development

There are no Admitted Farm Areas within boundary of the forest reserves. Small scale illegal subsistence farming activities within the degraded forest reserve are permitted to finalize their harvest and to continue their activities outside the reserve, where there is sufficient farming land available. The PP aims to establish a Training Farm to show and teach permanent agriculture systems.

The project does not foresee the harvesting or cutting of any existing trees or natural vegetation nor was any observed during the field visit. It rather protects existing trees and patches of forests by protecting the entire area through their internal fire management. Field visits confirmed the planting method of the PP whereby any pre-existing trees were left standing. Field visits also confirmed from the pilot plantings that individual standing trees were still existing and healthy in between the bamboo plantings. In addition the PP included the monitoring of existing trees in the general monitoring concept.

This was confirmed by TÜV Nord through document review, field visits and interviews with Community members and government authorities/09/10/.

3.2.2 Local Stakeholder Consultation

Procedures for engaging local stakeholders are described in the PD. Four main groups have been identified: The Ghana Forestry Commission, the Agogo Stool, fringe communities and employees. The core local stakeholder identified is the Ghana forestry commission as the fully responsible manager of the area by law. The Agogo Stool who owns the Land is included in the signing of the benefit sharing agreement /06/06a/ The involvement and ongoing communication with the Forestry Commission started in 2014. In 2021 a series of meetings was held with the Forestry commission and the community leaders of the nearby villages, which were also identified as stakeholders but neither have rights on the area nor depending on it. However, the fringe community represents the key source of workers. Employee engagement will follow EcoPlanet EH&S Standard Operating Procedures.

Detailed information is provided in the PD.

Communication and interaction with the Forestry Commission as core stakeholder concerning project design and implementation, risks, costs and benefits, relevant laws and regulations and the process of VCS Program validation are well organized. Same applies to communication with other parties involved. During the onsite visit the audit team conducted meetings and following interviews^{10/}:

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- Forestry Commission of Ghana:
 - Director of Operations, Forestry Service Division:
 - Manager Programs and MRV, Climate Change Directorate
 - District Manager, Juaso
- Forest Research Institute of Ghana:
 - Head of National Tree Seed Centre
 - Head of Wood Industry and Utilization
 - Nursery Manager
 - Silviculture Manager
- Village of Oseikrom Mankla:
 - Village Chief
 - Village Sub-Chief
 - Speaker
 - Community members
- Ecoplanet Bamboo:
 - CDo
 - Plantation, Operations, Finance Manager
 - Contactors
 - Staff

Thereby information provided in the PD and other documentation was verified.

3.2.3 Environmental Impact

As verified in meeting with the forestry commission, the project does not require any environmental impact assessment to be carried out under applicable legislation of the host country^{10/}.

3.2.4 Public Comments

No public comments were received through the Verra Platform during the public comment period from 04/04/2022 to 04/05/2022 <https://registry.verra.org/app/projectDetail/VCS/2929>

3.2.5 AFOLU-Specific Safeguards

The PD describes the following relevant stakeholder aspects: Validation Report: VCS Version 4.0

Stakeholder Identification and background

The project is being carried out on stool land, that is legally classified as a forest reserve administered by the Forestry Commission by law. All resource rights are with this authority. There are no communities or individuals living within these forest reserves.

Eternal stakeholders:

- Ghana Forestry Commission (GFC)
- The Agogo Stool
- Fringe communities

Internal Stakeholder

Employees

Risks, Costs and Benefits to Stakeholders:

Potential Risks are identified and described in the PD as Fire, Fulani Presence and Illegal Farms. Mitigation measures are described.

Respect to Stakeholders Resources:

The PD describes the property rights and ecosystem aspect. The Ghana Forestry Commission as the main stakeholder confirmed the Afforestation Plan including the use of the non-native species^{/23/}.

Procedures for On-Going Stakeholder Communication

The PD describes ongoing communication and consultations strategies. These procedures include EH&S Standard Operating Procedure #7 “Communication Procedure”, which specifically deals with stakeholder consultations.

The project has a Conflict Resolution/Grievance Mechanism^{/24/} in place.

The audit team confirms the conclusion of the PP that the project activity has no significant negative impacts on local stakeholders considering project and supporting documentation, field observations and information gathered through interviews with GFC, Communities, employees and the project team^{/10/}. The audit team conducted meetings and interviews with

representatives of the forestry commission on different levels as well as with representatives of the Forest Research Institute of Ghana, of one of the fringe village and of the PP and its employees and subcontractors. More details are described under 3.2.2. All parties visited were aware of the project activity and the validation audit.

3.3 Application of Methodology Validation Report: VCS Version 4.0

3.3.1 Title and Reference

The project applies the below approved CDM methodology:

AR-ACM0003 A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands Version 02.0

The methodology requires the use of certain tools: A complete list of all A/R methodological tools applicable to the project activity and the considered carbon sinks is provided in the PD.

Further tools connected to this methodology are not applicable to the specific project conditions. All tools are described under 3.3.2.

3.3.2 Applicability

The audit team has reviewed the explanation provided in the project design document for demonstrating that the project activity meets the requirements of the applicability criteria of the methodology. The following table gives TÜV NORD JI/CDM CP's assessment on the justification provided.

Applicability condition	TÜV Nord assessment and justification
The land subject to the project activity does not fall in wetland category	The planting takes place on degraded lands of the Forestry Reserve Bandai Hills. Wetlands are not included which could be observed during the onsite visit^{09/10/}. This was confirmed by interviewing the forestry authority, field staff, technical staff, plantation managers.
Soil disturbance attributable to the project activity does not cover more than 10 per cent of area in each of the following types	During the site visit it could be observed that the project activity did not result in any kind of soil disturbances above 10% of the area.

of land, when these lands are included within the project boundary: i. Land containing organic soils; ii. Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 1 and 2 to the methodology.	Ploughing is not applied. The bamboo is planted in hand dig holes, 30 x 30 x 30 cm. Spacing is 4 m x 5 m. (< 10% soil disturbance) This was confirmed by interviewing the field staff, technical staff, plantation managers^{09/10/}.
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Methodological tools	TÜV Nord assessment and justification
Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities v1	The applicability condition of this tool is assessed and explained in sections 3.3.4 and 3.3.5 of this report.
Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity	There are no applicability conditions contained in this tool.
Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (version 04.3);	Optional; no justifications required
Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities	Optional; Project area does not include wetlands or organic soils. The project area is characterized as forest land. Soils are classified as LACs. Soil disturbances are insignificant. This was confirmed by interviewing the forestry authority, field staff, technical staff, plantation managers and side inspections.
Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities	Optional; no displacement of agricultural activities that causes drainage of wetlands; occurrence of uncontrolled fires in the baseline. This was confirmed by interviewing the forestry authority, field staff, technical staff, plantation managers and side inspections.
Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity", version 4.0	Optional; not applied due to the specific project conditions. Fire is not applied for e.g., land preparation.
Estimation of the increase in GHG emissions attributable to displacement of	Project area does not include wetlands or organic soils. The project area is characterized

pre-project agricultural activities in A/ R CDM project activities	as forest land. Soils are classified as LACs. Soil disturbances are insignificant. This was confirmed by interviewing the forestry authority, field staff, technical staff, plantation managers and side inspections.
Tool for demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/ R CDM project activities	There are no applicability conditions contained in this tool. Optional; not referenced in the methodology
Calculation of the number of sample plots for measurements within A/R CDM project activities	There are no applicability conditions contained in this tool. Optional; not referenced in the methodology
Tool for the calculation of the number of sample plots for measurements within in A/R CDM project activities (optional) ✓	There are no applicability conditions contained in this tool. Optional; not referenced in the methodology

See CL 05.

TÜV Nord, based on records provided including spreadsheets estimations of the emissions reductions, has verified that applicability conditions of the different tools are complied. In conclusion, the project activity complies with the applicability conditions of the methodology, and tools selected by the PP.

3.3.3 Project Boundary

The PP has provided the details of the project area in the PD. The proposed project activity plants more than 1,750,000 Bamboo clumps within a degraded Forest Reserve, administered by the Ghana Forestry Department. The physical Project Boundary is defined by the boundary of the Reserve, but not the whole Reserve is part of the project area. Shapefiles^{/03/} are provided and in line with the land lease agreement and supporting documentation^{/05/06/06a/15/16/17/23/}. Further description is provided in section 3.1.8.

See CL 3.

The documents were thoroughly assessed by the audit team checking the eligibility assessment of the project area by using Google earth imagery. Visual assessment of satellite images is recognized as a good indication whether areas are covered by forests or other types of vegetation. It was also used by the auditor for pre-assessing the project area. That visual assessment is not sufficient to clearly define whether there has a forest or a non-forest cover neither in the history nor at present. A systematic remote sensing analysis of the forest cover is therefore state-of-the-art. As there is no possibility to do ground truthing for the historical forest

cover the audit team assessed the appropriateness of the remote sensing analysis based on the actual existing forest cover. Therefore, the area was inspected, and the results of the remote sensing analysis/03a/ compared to the situation as experienced in the field. Forest threshold in the project area was assessed by the audit team with expert judgement based on a high level of forestry knowledge, long term audit experience and country expertise in the project region. Results from the field assessment were matched with information gathered in interviews with differ levels of the Ghana forestry authority, local communities and staff. Moreover, the exploitation of the forestry reserve started decades ago by the timber industry. Neither was the PP active during these decades nor was there any indication that the project area was cleared of native ecosystems to create GHG credits. Hence, the audit team collected sufficient evidence to demonstrate that the project area has not been cleared of native ecosystems to create GHG credits.

To provide additional clarification the PP conducted an additional assessment using stronger forest threshold criteria to ensure the most conservative assessment of the forest cover. The audit team assessed this information and confirmed it conservativeness.

The audit team verified eligibility of lands during the onsite visit and interviews with the representatives of the Ghana Forestry Commission/09/ix/.

In accordance with the methodology applied and its corresponding tools, the following GHG sources, sinks and reservoirs for the project and baseline scenarios:

Source		Gas	Included?	Explanation/Justification
Baseline	Above and Below Ground Biomass	CO ₂	Yes	Carbon stock in above and below ground biomass is expected to decrease in the baseline scenario. The project assumes a zero value for this carbon pool, assumed to be conservative.
		CH ₄	No	GHG source not required by the methodology
		N ₂ O	No	GHG source not required by the methodology
	Soil Carbon	CO ₂	No	The methodology determines that this carbon pool is optional. SOC expected to decrease in the baseline scenario, therefore exclusion results in conservative approach.
		CH ₄	No	GHG source not required by the methodology
		N ₂ O	No	GHG source not required by the methodology

Project	Dead Wood and Litter	CO ₂	No	The methodology determines that this carbon pool is optional. Dead wood and litter are expected to decrease in the baseline scenario, therefore exclusion results in conservative approach.
		CH ₄	No	GHG source not required by the methodology
		N ₂ O	No	GHG source not required by the methodology
	Above and Below Ground Biomass	CO ₂	Yes	Carbon stock in above and below ground biomass is expected to increase as a direct result of implementation of the project activities
		CH ₄	No	GHG source not required by the methodology
		N ₂ O	No	GHG source not required by the methodology
	Soil Carbon	CO ₂	Yes	The methodology determines that this carbon pool is optional. SOC is expected to increase as a result of the project activities. Omitting it results in a conservative assessment of total GHG benefits.
		CH ₄	No	GHG source not required by the methodology
		N ₂ O	No	GHG source not required by the methodology
	Dead Wood	CO ₂	No	The methodology determines that this carbon pool is optional. Dead wood is not expected to change significantly as a result of the project activities.
		CH ₄	No	GHG source not required by the methodology
		N ₂ O	No	GHG source not required by the methodology
	Litter	CO ₂	Yes	Bamboo clumps drop significant volumes of leafy material each year, resulting in an increase in this carbon pool.
		CH ₄	No	GHG source not required by the methodology
		N ₂ O	No	GHG source not required by the methodology

Emission sources are excluded as the Project Activity does not include the burning of woody biomass for the purpose of site preparation, or as part of forest management.

TÜV NORD confirms that the project boundary and selected sources, sinks and reservoirs are justified for the project.

3.3.4 Baseline Scenario

The methodology requires the use of the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” V1. The tool uses CDM terminology. This tool requires the undertaking of a five step process. Step 0 and 1 refer to the identification of the Baseline Scenario..

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STEP 0. Preliminary screening based on the starting date

Starting date is June 1st 2022

Validation audit was in April 2022, prior to the project start date.

The project is requesting registration. It is designed as a carbon financed reforestation activity. This has been verified by the Audit team through document review/05/06/06a/, onsite inspection/09/ and interviews with the Ghana Forestry Commission/10/.

STEP 1. Identification of alternative scenarios

Sub-step 1a. Identify credible alternative land use scenarios to the proposed A/R CDM project activity

Detailed information is provided in the PD.

The Project area includes only areas inside forests reserves. These Forest Reserves in Ghana were officially designated between 1922 and 1948. Within the last 50 years, Bandai Hills was over exploited and is now described by the Forestry Commission as degraded Forest Reserve^{/13/}. An analysis of historical and current land use has been conducted using GIS and remote sensing assessment. It indicates that deforestation rates in the project areas were high during the period 1998 to 2012. This analysis, combined with visual evidence from different parts of the project boundary, shows that the pre-project land use results in a slow deterioration of forests into open woodlands and ultimately to grasslands, where the land is then partly converted to use for agricultural purposes.

Respective information is provided in the PD and supporting documents/10/.

Outcome of Sub-step 1a:

The following alternative land use scenarios have been identified as the plausible land use scenarios:

1. Continuation of pre-project land use
2. Conversion to small scale, unmanaged teak plantations
3. The current project activity without being registered as an AFOLU project

The mentioned alternative land use scenarios were checked during the site visit and confirmed by interviews, site observations and document review^{/09/10/}. The continuation of the pre-project is by far the most likely land use scenario for the project area.

No other possible alternative scenarios have been identified and appear reasonable for the project areas.

Sub-step 1b. Consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations

Although there are laws that should prevent the Forest reserves from over exploitation and degradation, these are not enforced as proven by the actual condition of the Reserve (Scenario 1). No applicable laws or regulations could be identified that would prevent scenario 2 or 3. Respective information has been provided in the PD and had been cross checked via the onsite visit by document review, interviews and observations made during a field visit.

Therefore, the plausible alternative land use scenarios remain as described above.

STEP 2. Barrier analysis

Sub-step 2a. Identification of barriers that would prevent the implementation of at least one of the alternative land use scenarios

The following barriers have been identified specific to the project type:

- Investment barriers:
 - Insecurity of market price for Bamboo
 - No present market for Bamboo raw material in bigger scale in West Africa
 - No availability of depth funding as due to slow financial return in forestry projects
- Technological barriers:
 - Lack of availability of planting material
 - Lack of availability of scientific or technical data
 - Lack of adding value to the Bamboo
- Barriers due to prevailing practise: The proposed project activity is the first of its kind. No project activity of this type is currently operational in the host country or region.
- Barriers due to local ecological conditions
 - Catastrophic natural and / or human—induced events: fire,
 - Pervasive opportunistic species preventing regeneration of trees

- Unfavourable course of ecological succession:
- Barriers due to social conditions:
 - Lack of skilled and / or property trained labour force
 - Lack of local knowledge of bamboo
- Barriers relating to land tenure, ownership, inheritance and property rights:
 - Insignificant availability of local markets for Bamboo
 - Remoteness of the project area

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A plausible list of barriers has been provided.

Sub-step 2b. Elimination of land use scenarios that are prevented by the identified barriers:

The PD describes how the barriers prevent the identified baseline scenarios. The land within the project boundary was also not partially forested since 1989. The small parts that were reforested with teak are not part of the project area/03a/09/. The only land use scenario which is not prevented by any barrier is: Continuation of pre-project land use (continued deforestation and forest degradation)

Sub-step 2c. Determination of baseline scenario.

Reforestation without being registered as an A/R CDM project activity is not included in the list of land use scenarios that are not prevented by any barrier.

Conclusion: The auditor assessed the barriers described against provided documents, interviews conducted with government authorities, expert knowledge and observations made during the field audit and therefore confirms the existence of the barriers^{/09/10/}.

“Continuation of pre-project land use” as these are common practice is the only land use scenario, which is not prevented by any of the above described barriers. Hence, it is the most plausible baseline scenario.

Step 3. Investment analysis is according to the tool not required and not applied.

Baseline stratification is not required in line with the description provided in the PD.

TÜV Nord confirms that the identified baseline scenarios “Continuation of the pre-project land use” is justified. The conclusion is based on the review of information provided by the PP and verified on observations made during the onsite visit by interviews and field inspections.

3.3.5 Additionality

As already described under 3.3.4 the PP uses the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities, v1”

The last step to be applied to identify additionality is the common practise analysis.

STEP 4. Common practice analysis Validation Report: VCS Version 4.0

A description and assessment of other bamboo projects in Ghana is provided in the PD.

None of the describes activities can be compared to the proposed project activity in respect to objective, scale and complexity.

The audit team verified the information provided by interviews internet research and by interviews conducted with representative of the Ghana Forestry Commission and the Forest Research Institute of Ghana/IV/.See CL 6.

Conclusion:

In view of the above TÜV NORD JI/CDM CP confirms that i) the project activity would not be a common practice in the geographical region of the assessment and ii) is not the baseline scenario. Thus, TÜV NORD JI/CDM CP confirms, that the proposed project activity is additional in compliance with the CDM methodological tool “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities v1”

TÜV NORD JI/CDM CP confirms that all data, rationales, assumptions, justifications, and documentation provided by the project participants to support demonstration of additionality are credible and reliable, which was checked and verified at the time of validation. TÜV NORD JI/CDM CP considers the reasoning for the proposed project additionality demonstration is credible and reasonable i.e., the proposed project has the ability to reduce anthropogenic emissions of greenhouse gases by sources below those that would have occurred in the absence of the registered VCS ARR project activity. The income from VCUs will help to overcome the faced barriers by the project and will alleviate the expected long time period for revenues.

3.3.6 Quantification of GHG Emission Reductions and Removals

Procedures for quantifying the GHG emission reductions and removals generated by the project during the project crediting period were conducted in accordance with the methodology “AR-ACM0003: Afforestation and reforestation of lands except wetlands”, Version 02.0. The validation team performed an intensive quantification review of all input data, parameters, formulas, calculations, conversions, statistics and resulting uncertainties and output data to ensure consistency with the VCS documentation, methodology modules, and the PD.

Furthermore, the validation team reproduced calculations for selected samples to ensure accuracy of the results. Conversion factors, formulas, and calculations were provided by the PP

in spreadsheet format to ensure all formulas were accessible for review. The validation team recalculated subsets of the analysis to confirm correctness. Where applicable, references for analysis methods or default values were checked against relevant scientific literature for best practice.

Quantification of baseline emissions:

Baseline net GHG removals by sinks are calculated using equation 1 of the applied methodology AR-ACM0003:

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t} + \Delta C_{DW_BSL,t} + \Delta C_{LI_BSL,t}$$

The baseline emissions for the project areas are those associated with negative land use change as the project areas undergo deforestation, forest degradation and further degradation of lands as indicated in the historical mapping. Under the conditions of the applied methodology, changes in carbon stock of above-ground and below-ground biomass of non-tree vegetation, dead wood, litter and soil organic pools are conservatively assumed to be zero for all strata in the baseline scenario:

$$\Delta C_{DW_BSL,t} = 0$$

$$\Delta C_{LI_BSL,t} = 0$$

Also changes in carbon stock of above-ground and below-ground biomass of shrub vegetation are conservatively assumed to be zero for all strata in the baseline scenario:

$$\Delta C_{SHRUB_BSL,t} = 0$$

Tree Biomass: It has been demonstrated by GIS and remote sensing analysis^{/01/} that in the absence of the proposed project activity tree harvesting for firewood and charcoal production and wild fires would continue and therefore remaining tree-cover would decrease overtime. The likelihood of tree cover increasing in the business as usual baseline scenario is considered not realistic due to increasing deforestation and pressure on existing forests^{/09/10/}.

Hence in the absence of the project, changes in tree biomass are rather expected to decrease in above ground and below ground carbon stock due to biomass loss and therefore may be conservatively assumed to be zero.

$$\Delta C_{TREE_BSL,t} = 0$$

Therefore the baseline net GHG removal by sinks is zero: $\Delta C_{BSL,t} = 0$

See CL 7.

Quantification of project emissions:

Ex-ante actual net GHG removals by sinks are calculated using Equation 2 and 3 of the applied methodology AR-ACM0003.

Ex ante stratification is determined by planting year and species.

The carbon calculation of the bamboo planted is based on the individual number of clumps and not on area. Only bamboo is considered in the quantification of the project's ex ante carbon calculation. As the bamboo clump biomass is very clearly distinguished from standing trees, such non bamboo biomass (trees) is conservatively removed from all calculations associated with the actual net GHG removals by sinks, as well as from the project's carbon monitoring plan.

According to the methodology "GHG emissions resulting from the removal of herbaceous vegetation, combustion of fuel, fertilizer application, use of wood, decomposition of litter and fine roots of N-fixing trees, construction of access roads within the project boundary and transportation attributable to the project activity shall be considered insignificant and therefore accounted as zero".

The actual net GHG removals by sinks are limited to changes in the carbon stock attributed to the planted bamboo clumps within the project areas.

These actual net GHG removals by the bamboo clump sinks are calculated as:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \quad \text{Equation (2)}$$

The increase in non-CO2 GHG emissions within the project boundary, as a result of the implementation of the ARR project activity $GHG_{E,t}$ is accounted as zero, as the project activities do not include the use of fire for land preparation activities as highlighted in the relevant tool.

$$GHG_{E,t} = 0$$

The change in the carbon stocks in the project, occurring in the selected carbon pools in year t, is calculated using equation (3) of the methodology. There "bamboo" has been used in clarification of "trees" within this equation.

$$\Delta C_{P,t} = \Delta C_{BAMBOO_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta SOC_{AL,t} \quad \text{Equation (3)}$$

Due to the specific characteristics of the project activity and the growth pattern of the sympodial bamboo species being grown, the conditions of the methodology, as well as difficulties in measurement options the following carbon pools are conservatively assumed to be zero.

$$\Delta C_{SHRUB_PROJ,t} = 0$$

$$\Delta C_{DW_PROJ,t} = 0$$

Changes in Bamboo Carbon Stock due to Project Activities

Change in carbon stock of the bamboo planted as a direct result of project activities is estimated as follows:

$$\Delta C_{\text{BAMBOO_PROJ},t} = (\Delta C_{\text{BAMBOO},t2} - (\Delta C_{\text{BAMBOO},t1}) / T \quad \text{Equation (4)}$$

Calculation of Bamboo Carbon Stock Validation Report: VCS Version 4.0

There are two carbon pools that are being quantified and monitored:

1. Bamboo Above Ground Biomass (AGB) – this pool consists of bamboo culms, branches and auxiliary leafy material;
2. Bamboo Below Ground Biomass (BGB) – this pool consists of bamboo rhizomes and extensive root networks;

Considering the wide spatial distribution of bamboo clumps being planted and the uniqueness of the splant compared to trees, the project proponents uses a Bamboo Clump as the unit of measure for the calculation of changes in bamboo biomass and therefore carbon removals.

For each species under consideration, the bamboo carbon stock at any point in time is calculated as follows:

$$C_{\text{BAMBOO_CLUMP}} = \text{AGB}_{\text{CLUMP}} * \text{RS} * \text{CF}$$

$C_{\text{BAMBOO_CLUMP}}$ = Carbon stocks in a bamboo clump, in year t; tC;

$\text{AGB}_{\text{CLUMP}}$ = The bone dry above ground biomass included in a bamboo clump, including all bamboo culms, branches and leafy material, in year t; tons

RS = The Root to Shoot ratio of a bamboo clump, used to calculate the below ground biomass represented by bamboo rhizomes and roots and measured in tons, in year t; tons

CF = The carbon fraction of woody biomass, given as 0.47

Determination of Above Ground Biomass: $\text{AGB}_{\text{CLUMP}}$

The detailed description as provided in the PD is included in this report, as it is essential to comprehend the difference between tree and bamboo in relation to the adaptation of the carbon calculation: “The first unique variable to be considered is that a bamboo clump consists of multiple culms. In contrast to a tree, these culms do not increase in diameter year on year, but rather emerge from the ground at their maximum diameter and achieve their maximum height within their first year of growth. Each year that the bamboo clump grows, additional culms emerge representing an increase in the AGB pool. Therefore, the first variable that requires measurement in order to report on changes in biomass due to the project planting activities, is the total number

of culms in the clump, and the average biomass within those culms. This can be calculated using allometric equations where the total biomass of the culm is a factor of the diameter of that culm.” IPCC does not provide guidance on biomass assessment of bamboo forests, and availability of data like species specific allometric equations for the determination of biomass utilizing culm and diameter as parameters measures are very limited. Therefore, the PP developed species specific allometric equations for the following species by destructive sampling.

- Dendrocalamus asper
- Bambusa textilis

This process of destructive sampling is described in the PD. The development of the allometric equation follows the Tool for “Demonstrating Appropriateness of Allometric Equations for Estimation of Aboveground Tree Biomass in A/R CDM Project Activities” UNFCCC/CCNUCC 2011. The Assessments have been checked for consistency and found in compliance with the requirements of the tool^{/25/56/}.

See also the description provided under section 3.3.7 Methodology deviation and in the PRR.

As each bamboo clump is comprised of multiple individual culms, the total above ground biomass of a single clump is a factor of the number of culms within that clump.

$$AGB_{CLUMP} = (AGB_{CULM} * MC * N_{CULM})$$

AGB_{CLUMP} = Above ground biomass of the bamboo clump at time t; tons

AGB_{CULM} = The above ground biomass of an individual culm, calculated using the allometric equation as described above; tons

MC = The moisture content of the bamboo biomass; %

N_{CULM} = The number of culms found within the bamboo clump at time t;

Dendrometric Variables

A detailed description how the determination of the biomass for the two different bamboo species has been assessed is provided in the PD. Available data, sources and literature was evaluated by the auditor and crosschecked with information gathered during field visits^{/9/} and interviews conducted^{/10/}. Conservativeness of data has been considered.

Calculation of Changes in Soil Organic Carbon

A detailed description is provided in the PD. The PP applied the “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities” Version

01.1.0.” Following input values have been selected and verified for the calculation of the SOC stock:

- Soil Stratum: Climatic Region: tropical-moist/Soil Type: Low Activity Clay (LAC)
- Pre Project Activities: Land use: Grassland; Management: Severely degraded; Input: low

The SOC stock at the start of the project is estimated using the following equation:

$$SOC_{INITIAL,i} = SOC_{REF,i} * f_{LU,i} * f_{MG,i} * f_{IN,i}$$

$$SOC_{initial,i} = 32,9 \text{ tCha}^{-1}$$

The rate of change in SOC stock in project scenario until the steady state SOC is reached is calculated with the following equation:

$$dSOC_{t,i} = \left(\frac{SOC_{REF,i} - SOC_{INITIAL,i} - SOC_{LOSS,i}}{20 \text{ years}} \right)^2 \text{ for } t_{PREP,i} < t \leq t_{PREP,i} + 20$$

$$dSOC_{t,i} = 0,71 \text{ tCha}^{-1}$$

See CL 8.

Calculation of Changes in Litter Carbon:

A detailed description is provided in the PD. The PP applied the “Tool for estimation of carbon stocks and change in carbon stocks in dead wood and litter in due A/R CDM project activities” Version 03. The PP used the “Default Factor” based methodology with following and therefore the following equation was applied:

$$C_{LI,i,t} = C_{TREE,i,t} \times DF_{LI}$$

The project area biome is tropical, with annual rainfall amounts in the 1,000 – 1,600 mm/yr range, resulting in a 1% default factor.

Quantification of leakage:

A detailed description is provided in the PD. The PP applied the “A/R Tool “Estimation of the increase in GHG emissions attributable to displacement of pre—project agricultural activities in the A/ R project activity.

$$LK_t = LK_{AGRIC,t}$$

There is no displacement of agricultural activities, crop cultivation and / or grazing activities, that should result in an increase in GHG emissions. Hence leakage is considered as 0

$$LK_t = 0$$

Quantification of leakage:

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Leakage emissions are accounted as zero in compliance with section 6 of the AR-Tool 15 as no displacement of agricultural activities takes place.

This could be confirmed in the course of the field visit via interviews held with technical staff, plantation managers and community members^{/09/10/}.

Data and Parameters available at validation:

Following Data and Parameter available at validation have been described in the PD under section 5.1:

Description of Data / Parameter	Value applied	TÜV Nord assessment and justification
The total number of bamboo clumps by species that are planted Dendrocalamus asper, Bambusa textilis	1,750,000 1,750,000	Data for ex ante calculation, Planting schedule ^{/04/} Confirmed via field visit ^{/09/} and planting schedule ^{/27/}
Allometric equation for the calculation of above ground biomass of Dendrocalamus asper, from measurements of culm diameter	(0.084491 * BHD ^{2.647555}) * BEF	Development of Species Specific Allometric Equations for Dendrocalamus asper ^{/25/} Availability of literature data is sparse and not sufficient reliable to compare. Hence, the Audit team verified the realistic and conservative data input for the development of the species specific allometric equation and the carbon calculation by comparing it with unmanaged 5 year old trial plantings of bamboo (Asper and Textilis) established by the PP next to the project area. Asper: Field Data: No of Clumps >20 versus 8 in the cc, and

		Diameter of 8 cm at full growth (8 years and up) • Textilis: Field data: No of Clumps >50 versus 10 in the cc, and Diameter of 7cm • The ex-ante estimations are confirmed by the above field data to be conservative. See FAR 2023-02
Allometric equation for the calculation of above ground biomass of Bambusa textilis, from measurements of culm diameter	0.933277* (BHD ^{1.802318})	Development of Species Specific Allometric Equations for Bambusa textilis /26/ See comments above.
Biomass Expansion Factor for Asper	1.4	Development of Species Specific Allometric Equations for Dendrocalamus asper/25/
Litter Carbon	1% of the total bamboo biomass for each stratum	IPCC Guidelines, Tool for estimation of carbon stocks and change in carbon stocks in dead wood and litter in due A/R CDM project activities, Version 03.
Soil Organic Carbon (SOC)		
The root to shoot ratio or the ratio of below to above ground biomass) applied to calculate the below ground biomass of sympodial bamboo species	1:0.25	Confirmed via Peer Reviewed Literature/28/
Carbon fraction of bamboo biomass	0.47	IPCC default factor for woody biomass, conservative
Conversion of Carbon to Carbon Dioxide Equivalent	44/12	Standard conversion factor, IPCC
Two-sided Student's t-value, at infinite degrees of freedom, for 90% confidence level	1.645	Confirmed via data for ex ante calculation/03/29
Estimated standard deviation of biomass stock in stratum i.	35%	Confirmed via data for ex ante calculation/03/29
Acceptable margin of error (i.e. one-half the confidence interval) in estimation of the biomass stock within the project boundary	10%	Confirmed via data for ex ante calculation/03/29

Estimated Net GHG Emission Removals by Year

Year	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
06.2022 - 06.2023	0	1.655,13	0	1.655,13
06.2023 - 06.2024	0	9.557,05	0	9.557,05
06.2024 - 06.2025	0	59.672,89	0	59.672,89
06.2025 - 06.2026	0	150.192,44	0	150.192,44
06.2026 - 06.2027	0	335.879,64	0	335.879,64
06.2027 - 06.2028	0	667.227,38	0	667.227,38
06.2028 - 06.2029	0	1.270.428,97	0	1.270.428,97
06.2029 - 06.2030	0	2.128.951,70	0	2.128.951,70
06.2030 - 06.2031	0	2.602.485,83	0	2.602.485,83
06.2031 - 06.2032	0	3.298.570,80	0	3.298.570,80
06.2032 - 06.2033	0	3.697.083,43	0	3.697.083,43
06.2033 - 06.2034	0	3.706.130,93	0	3.706.130,93
06.2034 - 06.2035	0	3.715.178,43	0	3.715.178,43
06.2035 - 06.2036	0	3.724.225,93	0	3.724.225,93

06.2036 - 06.2037	0	3.733.273,43	0	3.733.273,43
06.2037 - 06.2038	0	3.742.320,93	0	3.742.320,93
06.2038 - 06.2039	0	3.751.368,43	0	3.751.368,43
06.2039 - 06.2040	0	3.760.415,93	0	3.760.415,93
06.2040 - 06.2041	0	3.769.463,43	0	3.769.463,43
06.2041 - 06.2042	0	3.778.510,93	0	3.778.510,93
TOTAL				3.778.510,93

TÜV NORD JI/CDM CP assessed the calculations of baseline emissions and project emissions and the expected net GHG reductions and removals by sinks. Corresponding calculations were carried out based on calculation spreadsheets/^{03/} provided. Correctness of calculations can be confirmed as they were replicated by the audit team using the information provided. The values and estimates presented in the PD are considered reasonable based on the documentation reviewed, further references and the result of the interviews during the onsite visit.

Based on the information reviewed TÜV NORD JI/CDM CP can confirm that the sources used are correctly quoted and interpreted in the PD. All assumptions and data indicated in the PD, and all relevant sources were checked and confirmed.

In essence TÜV NORD JI/CDM CP can confirm that the methodology was correctly applied following the requirements. All values in the PD are considered reasonable in the context of the proposed VCS project activity. Data sources are quoted correctly. Hence, the calculation of baseline stocks and removals, leakage and the expected net anthropogenic GHG removals by sinks are considered correct.

3.3.7 Methodology Deviations

The PD includes a description of a methodology deviation in section 3.6. and more detailed in section 4.2. this connects to the use of the AR-TOOL 14, This only applies to selecting allometric equations for ex-post estimation of carbon stocks in woody biomass. As allometric equations for ex-ante estimation must be selected following Annex 1,6 of the AR-TOOL 14. The only applicable data existing is the data selected by the PP. None of the sources listed in the AR-TOOL 14 under Annex 1 point 6 were seen as adequate, as the Bamboo Project is the first of its kind concerning the planted species, provenance, technology and ecological conditions. Hence the PP used the process for developing an equation for ex-post calculation in line with the CDM

AR-TOOL 17. This also states, that for ex ante estimation of aboveground tree biomass in project scenario any allometric equation can be used. So the PP used the species specific developed allometric equations for the ex-ante estimation^{4/}. The outcome of these equations is compared with data from an article published in the BAMBOO JOURNAL, No. 29 March 2015/41/ that shows the identical value for 5 year old *Dendrocalamus asper* propagated by rhizome cutting in tC/ha as calculated by the PP /04/: 41 tC. However, number of clumps/ha and culms/clump differ. As availability of literature data is sparse and not sufficient reliable to compare the Audit team verified the realistic and conservative data input for the development of the species specific allometric equation and the carbon calculation by comparing it with unmanaged 5 year old trial plantings of bamboo (*Asper* and *Textilis*) established by the PP next to the project area.

- *Asper*: Field Data: No of Clumps >20 versus 8 in the cc, and Diameter of 8 cm at full growth (8 years and up)
- *Textilis*: Field data: No of Clumps >50 versus 10 in the cc, and Diameter of 7cm
- The ex-ante estimations are confirmed by the above field data to be conservative.
- The VERPA/37/ includes a further conservative approach as it deducts abt. 20% from the calculated number of VERs in the PD.
- The risk for non-continuation is rated low as the project is pre-financed. Bamboo once established is difficult to remove and shows a high resistance to natural risks like fire and drought.

FAR 2023-02 has been raised to ensure that the developed allometric equations are assessed and verified at 1st verification.

The audit team assessed the provided information and reference and confirms the realistic estimate of the developed equation in the context of the sparse availability of available data.

Concerning the methodology deviation the audit team concludes as follows:

- The deviation is permitted, as it connects to “criteria and procedures relating to monitoring or measurement set out in the methodology (i.e., deviations are permitted where they relate to data and parameters available at validation, data and parameters monitored, or the monitoring plan)”
- The calculated data based on the equation developed seems realistic as described above and due to the non-availability of sound scientific data it rather results into the increased accuracy of data.
- It relates to ex ante-estimations and therefore the quantification of GHG emissions reductions or removals to issue VES is not affected.

Therefore the audit team concludes that the deviation of the Methodology is accepted.

3.3.8 Monitoring Plan

The monitoring plan presented in the PD complies with the requirement of the applied methodology. The assessment team checked all parameters presented in the monitoring plan

against the requirements of the VCS standard and the methodology. For the monitoring of carbon stock changes under the VCS the requirements and parameter list as per methodology were followed. Relevant parameters available at validation are listed in the PD and are considered valid by the audit team as all values are derived either from IPCC sources, or other well-regarded published literature. As described in the PD, site specific allometric equations were developed for the ex-ante calculation of above ground biomass of *Dendrocalamus asper* and *Bambusa textilis*. Details are provided under section 3.3.6 in this report. No errors or misrepresentations were detected in the review of these data and based on review of the calculations of the project proponent, no values are missing. All relevant parameters that need to be monitored for verification are listed in the PD as required by the methodology.

In addition, the PP included the monitoring of pre-existing trees to document the impact by the bamboo plantation. Monitoring will occur as part of the carbon monitoring process within the dedicated Permanent Sample Plots.

The monitoring procedures as defined in the PD were reviewed by the audit team on paper and through interviews with the relevant personnel; this information together with a physical inspection allows the audit team to confirm that the proposed monitoring plan is feasible within the project design^{/01/04/10/}. TÜV Nord concludes that the PP is able to implement the monitoring plan to report ex-post GHG net anthropogenic removals, which can also be verified.

3.4 Non-Permanence Risk Analysis

Internal Risks

Project Management		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Not applicable. No GHG credits have previously been issues. Both species had been introduced into Ghana many years before the project start date, including by the International Network of Bamboo and Rattan (INBAR) as being suitable to the West African location. Both species are approved by the Ghana Forestry Commission ^{/23/} .	0 is accepted
b)	Not applicable. No GHG credits have previously been issues. No significant encroachment of outside actors.	0 is accepted
c)	EcoPlanet Bamboo's team covers individuals with extensive (>10 years' experience) in all aspects required for the successful implementation of this project ^{/09/10/30/31/}	2 is accepted

d)	EcoPlanet Bamboo has a full-time management team located in the closest town of Agogo, 1-2 hour drive from the furthest point of the project /09/10/.	0 is accepted
e)	EcoPlanet Bamboo's Chief Operating Officer, Camille Rebelo has more than a decade of experience in the design, implementation, management and successful deliverable of AFOLU carbon projects, under both the VCS and CDM/09/10	-2 is accepted
f)	EcoPlanet Bamboo employs a companywide policy on adaptive management/09/10/18	-2 is accepted
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)] Total may be less than zero.		-4 is accepted

Financial Viability		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	The project is presently designed as a carbon Project only. It is planting bamboo at a scale for which there is no current market for the raw material. As such the project is using a conservative timeframe for achieving cash flow breakeven, of greater than 10 years.	3 is accepted
b)	Not applicable.	2 is accepted
c)	Not applicable.	0 is accepted
d)	Not applicable.	0 is accepted
e)	Not applicable.	0 is accepted
f)	Not applicable.	0 is accepted
g)	Not applicable.	0 is accepted
h)	The project proponent has secured 100% of the funds necessary to cover the total cash out before the project breaks even. The commitment in the form of a "VER Purchase Agreement, Bandai Hills	0 is accepted

	Bamboo Reforestation Project; 2021 (confidential)” had been verified during onsite visit/ ^{32/} .	
i)	The project has committed funds for the scale of planting detailed in the validation report as evidenced by the commitment in the form of a “VER Purchase Agreement, Bandai Hills Bamboo Reforestation Project; 2021 (confidential)” had been verified during onsite visit/ ^{32/} .	-2 is accepted
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		0 is accepted

Opportunity Cost		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Not applicable.	0 is accepted
b)	Not applicable.	0 is accepted
c)	Not applicable.	0 is accepted
d)	The baseline scenario is one of continued forest degradation due to predominantly uncontrolled wildfires, and the subsequent conversion of the project area to unutilized grasslands. The only activities that occur within the project boundaries in the baseline scenario are those that are occur illegally and are limited to subsistence activities at in insignificant scale/ ^{09/10/} . Net positive community aspects are obvious and were demonstrated in the PD.	0 is accepted
e)	Not applicable.	0 is accepted
f)	Not applicable.	0 is accepted
g)	Not applicable.	0 is accepted
h)	The project proponents hold an executed commitment by the Ghana Forestry Commission to maintain the planted bamboo and the associated carbon stocks for the duration of the project crediting	-2 is accepted

	period. This legal document has been provided to auditors as part of the validation audit/ ^{13/} .	
i)	Not applicable.	0 is accepted
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g + h or i)] Total may be less than 0.		0 is accepted

Project Longevity		
a)	The project is managed under a public private partnership agreement. Management plans and financial plans have been approved by the Ghana Forestry Commission/^{05/06/6a/23/}. Furthermore, the project longevity is assumed with 60 years. This is in accordance with the (conservative) assumption of the minimum lifetime of the bamboo species planted. The following external information have been checked for verification of the Lifetime of the planted species: 1. Bambusa textilis has a productive lifecycle of upwards of 60 years https://www.researchgate.net/publication/348325755) 2. Dendrocalamus asper (This species usually flowers when around 100 - 120 years old: https://pfaf.org/user/Plant.aspx?LatinName=Dendrocalamus+asper) In addition, the Forest Reserve is to be managed as a Forest by the GFC by law. Hence it could be assumed, that the carbon storage will be continued for more than 100 years. But as law enforcement is not secured, the lifetime is conservatively confirmed with 60 years.	12 is accepted
b)	There is no legal agreement or requirement to continue the management practice.	0 is accepted
Total Project Longevity (PL) May not be less than zero		12 is accepted

Internal Risk	
Total Internal Risk (PM + FV + OC + PL)	7 is accepted

Total may not be less than zero.

External Risks

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Land Tenure and Resource Access/Impacts		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Not applicable.	0 is accepted
b)	The land is owned by the Agogo Stool, administered by law under the government of Ghana and the project proponent holds a /long-term lease. This had been confirmed during field visit, interviews ^{09/10/} and document review ^{05/06/13/19/} .	2 is accepted
c)	During document review, field visit and interviews no information on existing disputes over land tenure and ownership were observed ^{09/10/} .	0 is accepted
d)	During document review, field visit and interviews no information on existing disputes over access use rights or overlapping rights were observed ^{09/10/} .	0 is accepted
e)	Not a WCR project, therefore not applicable.	0 is accepted
f)	Not applicable.	0 is accepted
g)	Not applicable.	0 is accepted
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e + f + g)]		2 is accepted
Total may not be less than zero.		

Community Engagement		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	The risk factor does not apply, as there are no households reliant to the project areas. Respective information has been provided and verified by the audit team by document review, field visit and interviews ^{09/10/} .	0 is accepted
b)	The risk factor does not apply, as there are no households reliant to the project areas. Respective information has been provided and verified by the audit team by document review, field visit and interviews ^{09/10/} .	0 is accepted

c)	Not applicable.	0 is accepted
Total Community Engagement (CE) [where applicable, (a + b + c)]		0 is accepted
Total may be less than zero.		

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Political Risk		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Not applicable.	0 is accepted
b)	Not applicable.	0 is accepted
c)	Not applicable.	0 is accepted
d)	The governance score is calculated correctly with 0.03 ^{/34/}	2 is accepted
e)	Not applicable.	0 is accepted
f)	Ghana is engaged in REDD+ activities and has received REDD+ Readiness funding from UN-REDD amongst other donors. The country has a clear REDD+ policy framework in place. This has been verified by the audit team ^{/34/35/} .	-2 is accepted
Total Political (PC) [as applicable ((a, b, c, d or e) + f)]		0 is accepted
Total may not be less than zero.		

External Risk	
Total External Risk (LT + CE + PC)	4 is accepted
Total may not be less than zero.	

Natural Risks

Natural Risk: Fire	
Significance	The verification team confirms the general resistance of bamboo against fire. The risk of a damage is therefore confirmed as low (less than 5 % of the carbon stock).

	Regrowth was observed and replanting of dead seedlings is considered as part of the bamboo management procedures. In addition, the fire management and prevention are subject of adaptation according to information by the management team. This is confirmed by the audit team via adequate scientific literature ^{/22/}, field visit and interviews^{/09/10/}.
Likelihood	A conservative likelihood of less than every 10 years has been used due to no available data on the frequency of fire within the project areas.
Score (LS)	2 is acceptable
Mitigation	0.5 is acceptable EcoPlanet has in place well developed fire management plans, a qualified forestry manager with expertise in fire management, and a trained fire patrol team on duty throughout the 3-4 month fire season.

Natural Risk: Pest and Disease

Significance	The audit team confirms the high resistance of bamboo against pests and diseases. The incidents described do not cause measurable loss of biomass and therefore the carbon content of the bamboo. Furthermore, an increased mortality rate of the seedlings would result either in replanting or in not reporting such clumps at monitoring. The audit team considers the significance as “No Loss” of carbon and therefore as 0.
Likelihood	The audit team concludes that the likelihood of and pest and disease event (herbivores and chicken) is according to the field observations ^{/09/10/} “less than every 10 years”.
Score (LS)	0 is acceptable
Mitigation	Not applicable

Natural Risk: Extreme Weather

Significance	Extreme weather events that occur in the region and potentially have significance to the project’s carbon removals are limited to drought, as bamboo seedlings are sensitive to water shortage in the first 12 months. Other weather events are not reported to harm bamboo plants.
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	Statements made in the non-permanence risk report can be confirmed as reasonable. Therefore, audit team confirms the significance of extreme weather as “Insignificant”, considering information from document review, interviews with farmers and experts and site visits^{/09/10/}.
Likelihood	As confirmed during the onsite visit by interviews^{/09/} with farmers, droughts or other extreme weather events are unlikely for the project areas. Therefore, the audit team confirms the likelihood of this risk as estimated “Once every 100 years or more, or risk is not applicable to the project area”.
Score (LS)	0 is acceptable
Mitigation	The project has mitigated the risk of drought by carrying out pilot plantings over a five year period prior to the start of project activities, to ensure that both species are adapted to the project conditions. Furthermore, the project proponent carried out a replanting event to mitigate any effects and maximize stocking density in the project area. project. The mitigation measures as described were verified by the audit team during the field visit^{/09/10/}. Mitigation rating of 0.5 is accepted, with no effect on the calculation.

Natural Risk: Geological Risks

Significance	No relevant geological risks are reported in the project area.
Likelihood	No relevant geological risks are reported in the project area. Risk is not applicable to the project areas.
Score (LS)	0 is acceptable
Mitigation	Not applicable as no risk expected

Natural Risk: Other Risks

Significance	No other natural risks to the project activities and associated carbon removals are anticipated. This is confirmed by the audit team. No other risks are known^{/7/9/}.
Likelihood	Not applicable

Score (LS)	0 is acceptable
Mitigation	Not applicable

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

Overall Risk Rating

Risk Category	Rating
Internal Risk	7
External Risk	2
Natural Risk	1
Overall Risk Rating (a + b + c)	10

The non-permanence risk deduction to be applied for the project is calculated with 10%.

TÜV Nord has checked that information provided in the Non-Permanence Risk Report is consistent with the support documents provided. TÜV Nord deems that information provided is reliable and appropriate. Thus, the audit team concludes that the applied risk score of 10% is adequate for the project activity. These results in the following:

- Estimated Net GHG emission removals: 3,778,511
- Estimated Buffer credits (10% of Net GHG Benefits): 377,851

- Estimated Total GHG credits / VCUs: 3,400,660

In this context CL 8 has been opened and were successfully closed/APPENDIX/.

4 VALIDATION CONCLUSION

EcoPlanet Bamboo Ltd. has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project: Validation Report: VCS Version 4.0

“Bandai Hills Bamboo Reforestation Project, Ghana”

in Ghana with regard to the requirements of VCS 4.3 Standard. The AFOLU grouped project involves the reforestation with bamboo; thus, GHG are removed.

In the course of this validation four (2) Corrective Action Requests (CARs) and two (9) Clarification Requests (CLs) were raised and successfully closed. One (1) Forward Action Request (FAR) was raised for consideration at verification.

The validation is based on project design documentation, the non-permanence risk assessment, the ex-ante carbon calculation spreadsheet and additional documents related to baseline and monitoring methodology. Subsequent background investigation, field visits, follow-up interviews and review of comments have provided TÜV-Nord with sufficient evidence to validate the fulfilment of the stated criteria.

In detail TÜV NORD confirms:

- The project is in line with all criteria of the VCS Standard v4.3.
- The project additionality is sufficiently justified in the PD.
- The Monitoring Plan is transparent and adequate.
- The analysis of the baseline emission, project emissions and leakage has been carried out in a transparent and conservative manner, so that the calculated long-term average GHG benefits of 3,778,511 tCO₂e is most likely to be achieved within the 20 years crediting period from 01-June 2022 to 31-May-2042 resulting in an average annual GHG emission removal of 188,926 tCO₂e.

Augsburg, 27. February 2024



Martin Seitz

Validation Leader

JI/CDM Certification Program

Hannover, 27. February 2024



Alexandra Nuske

Final Approver

JI/CDM Certification Program

APPENDIX I: LIST OF FINDINGS

Validation Report: VCS Version 4.0

Finding:	CAR 01		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Editorial aspects of the PD: 1. Consider the findings of the CARs and CLs and update PD accordingly. 2. Frontpage: check format of "date of Issue" 3. PD Page 13: in the text "figure 1" is mentioned but referring to the actual figure 2 below. 4. PD Page 97: "an individual clump of the <u>three</u> species the wording is three instead of two species. 5. Update Section 2.4 Public comments 6. Carbon Calculation: Excel Sheet, Species, Row 3: Include the unit in (F/3) and (H/3)		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The PP has updated the PD accordingly, including the date and version. 1. All CARs and CLs have been addressed; 2. The frontpage of the PD has been updated with the correct date format, and the date and version updated accordingly. 3. Text and figure have been aligned to be correct on page 13. 4. This error was on Page 76 (not Page 97) and has been corrected to refer to two species. 5. Section 2.4 has been updated to include the date of the public comment period, along with confirming that there were no comments received. 6. The carbon calculation spreadsheets have been updated to include the units in F/3 and H/3		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	All points above have been considered, changed and clarified. Respective documents have been adapted.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken		

Finding:	CAR 01
	☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:		CL 01	
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Validation Report: VCS Version 4.0 PD 1.11 Project description: Provide further information in the PD concerning the management of the plantation after planting: monitoring of mortality, replanting, maintenance, harvesting, etc. including SOPs		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The PP has updated Section 1.11 through the addition of two sections • Post Planting Maintenance Activities • Mortality Monitoring and Blanking Activities This added information includes reference to the relevant SoPs. There is no harvesting included in the project activities, only the selective thinning of individual mature culms, which as per the growth cycle of a bamboo clump, would have died within the next growth period. A section on such thinning has been included.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Further detailed information concerning monitoring of mortality, replanting, maintenance and harvesting has been included in the PD section 1.11. Respective SOPs for land preparation, planting and plant replacement have been provided as additional evidence ^{10/11/12/} information and documentation provided were found to be in compliance with standards requirements and field findings.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:		CL 02	
Classification	☐ CAR ☒ CL ☐ FAR	Validation report: VCS Version 4.0	
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Land Tenure: Provide clarification that “EcoPlanet Bamboo WA I, LLC” that holds the long term land lease title is wholly owned subsidiary of the project proponent, EcoPlanet Bamboo Group, LLC.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The PP has provided supplementary documentation: - Company organizational chart - Operating agreement for EcoPlanet Bamboo WA II, LLC		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The organisational chart of the EcoPlanet Bamboo Group/ ^{14/} has been provided in addition with the Limited Liability Company Agreement/ ^{13/} . Provide sufficient evidence to the other team that “EcoPlanet Bamboo WA I, LLC” Is fully owned by “EcoPlanet Bamboo Group, LLC”.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	CAR 02		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	There are different forest definitions for Ghana. The PP is using the following forest threshold, which has been confirmed by literature ^{/37/08/} and direct interview with the Director of Operations (Plantations) of Forestry Commission/Ghana^{/10/}. Community of trees on land with a minimum area of 1 hectare, minimum tree crown cover of 15%, or with existing tree species having the potential of attaining at least 15% crown cover, with trees that have a minimum height or potential to reach a height of 5.0 meters at maturity in situ. Bamboo is included (Bambusa and Dendrocalamus spp, for the Transition Zone) ^{/7/} The analysis of the Forest Cover (historical and actual) is based on a different definition area 0.5 ha, 10 % crown cover, height 5 m) and the results are used for the eligibility assessment and carbon calculations. Reassess the forest cover maps according to the FC definition of forests and in consequence adapt the eligibility assessment and the carbon calculation to the new assessment.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The GIS and remote sensing analysis has been updated to reflect the stated definition of forest as described above. The eligibility assessment has been updated to reflect the change from 25.0 hectares to 21.2 hectares of standing forest at the project start date. All maps and analysis have been updated accordingly. The VVB has requested the PP to adapt the carbon calculation to the new assessment. It should be noted that this is not required as this change has no consequence on the total area of bamboo or number of clumps to be planted. The PP is targeting a total of 1.5M bamboo clumps or 3,500 hectares, which is considerably less area than the total area included within the project boundary. The above change in forest definition and increase in areas that were not classified as forest at the project start date has no effect on the carbon calculations.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The description of the remote sensing as part of the eligibility assessment in section 3.4 of the PD has not been updated completely. There are still some incoherent figures that do not correspond to the updated analysis		

Finding:	CAR 02
	1. pages 23, 75: "...325.0 ha, 2. Page 59: Figure 16; density of standing trees 2020: 278 ha of forests 3. Figure 14 shows a forest cover of 62 ha in 2011 in contrary to the 325 ha mentioned above. 4. The KML file provided does not detect the Project area in ha 5. Provide the following documents: - KML files with Project area data - GIS and remote sensing analysis Shapefiles of the area eligible for planting
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	All errors have been corrected and made consistent with the updated maps. Figure 16 has been updated to be the correct version. Shape files and updated KML files of the project area have been provided
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The PD had been updated and respective evidence was provided. The change in forest cover has no effect in the implementation of the project as there is sufficient potential land available under the land lease agreement and areas detected as forests are not included in the eligible planting areas. - GIS and remote sensing workflow/^{9/} - Shapefiles of the forest area non eligible for planting/^{07/}
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:		CL 03	
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Validation report: VCS Version 4.0 PD 1.18: Commercially sensitive information: Include information on documents with “commercially sensitive information”, which were made available to the Audit team but not to the public.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Section 1.18 of the PD has been updated to reflect the commercially sensitive documents that were shared with the audit team but are not available to the public.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Respective information has been included in the PD.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:		CL 04	
Classification	☐ CAR ☒ CL ☐ FAR		
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	PD 3.1/3.2: Assure that all tools applicable to the methodology or applied in addition are listed in the PD section 3.1/3.2: Following tool is not listed: Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity. Include information of this source (burning of biomass) also in the tables of the Project Carbon Pools in the PD (table 5) in line with the methodology.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Section 3.1 of the PD has been updated to include the tool for the Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity. Section 3.2 of the PD has been updated to include the tool for the Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity. Section 3.3 of the PD has been updated to include an additional table (Table 6) - Emission Sources and GHGs Selected for Accounting – following the guidelines of the methodology.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The different sections in the PD have been updated. Update table 5 in the PD (page 50) as required by the PD template; include information to all gases (CH4, N2O, Other).		
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The table has been updated to include all GHGs		
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The PD had been updated. All information requested in is now included in table 5.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	CL 05		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding Describe the finding in unambiguous style; address the context (e.g. section)	Validation report: VCS Version 4.0 3.4/3.5: 1. Include information in the baseline assessment concerning the failed teak plantations that are visible in the field. Verra excluded them in their pre-listing screening as a separate plausible baseline scenario/¹¹/, but nevertheless they are part of the scenario "Continuation of the pre-project land use". 2. Include information in the additionality section concerning the following requirement: <i>"If the land within the boundary of the proposed A/R CDM project was at least partially forested since 31 December 1989 and the land is not a forest at the project start, is it demonstrated that under the current conditions (legal, financial, socio-economical, ecological or others) repetition of the forestation performed without being registered as the A/R CDM project activity is not possible?"</i> 3. Include information on the following requirements of the tool, taking into consideration the afforestation activities in the surrounding forest reserves. <i>"If applicable, forestation of at least a part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from</i> - o legal requirements; or - o Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date."		
Corrective Action #1 This section shall be filled by the PP. It shall address the corrective action taken in details.	The PP has addressed the above points raised as below: 1. The PP had originally included the small scale planting of teak as an alternative land use scenario due to its occurrence outside of the project boundaries as well as in micro trials within the project boundary, however as confirmed by the GFC this activity had been stopped in the Bandai Hills Forest Reserve and was not considered a viable one. Due to the fact that this is not a credible alternative given the failure of this activity within the geographic region, Verra already raised to the PP that this should not be considered an alternative land use scenario under the standard, and therefore the PP removed it.		

Finding:	CL 05
	At the request of the VVB this alternative land use scenario has been put back into the PD, along with an explanation in Sub Step 1c as to why this is not the selected baseline scenario. 2. The PP is using the VCS adapted additionality tool and therefore does not believe that this request is applicable. 3. The PP has re-added Small Scale, Unmanaged Teak Plantations into the PD Section 3. Step 1, Sub-Step 1a, following point iii.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The PP addressed all requests and added respective information in the PD. The Auditor considers the teak plantation as a potential baseline scenario that needed to be included in the assessment as teak plantations at different scale and quality were observed during the onsite visit in the vicinity of the project area. In the further assessment, the teak plantations have been excluded as they are not the most plausible baseline scenario.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	CL 06		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Validation Report: VCS Version 4.0 4.1: Include the complete Equation 1 according to the Methodology (including Dead Wood)		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Section 4.1, Equation 1 has been updated to include dead wood.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	No equations have been included in section 4.1 Baseline Emissions. The PD template requests: "Include all relevant equations and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values)."		
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	This section has been replaced to include the relevant equations and justifications.		
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The PP added respective information in the PD.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:		CL 07	
Classification	☐ CAR ☒ CL ☐ FAR		
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Validation Report: VCS Version 4.0 PD: Calculation of Changes in Soil Organic Carbon 1. Provide explanation and evidence of the soil type HAC 2. Provide explanation and evidence on the “relative stock change factors” and the applied default value of 0.7 3. Provide the calculation of the changes in SOC in the PD ore via the applicable Excel “CDM SOC tool”		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The PP has made the following updates to the section on SOC in the PD: 1. Updated the soil type from HAC to LAC and added a soil map of Ghana showing the project location. 2. Updated all relative stock change factors and provided explanations 3. Provided details of the calculations in the PD. These changes result in a reduced rate of increase of SOC, to 0.705. The excel spreadsheets have been updated accordingly, along with all tables in the PD, and the Non Permanence Risk Assessment. As a result of this finding the PP has also included the use of the Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities” and therefore this has also been added to Section 3.1 and 3.2. Section 3.1 and 3.2. Section 3.1 and 3.2.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Respective information has been provided in the PD (Soil Map, etc.). References and updated calculations have been crosschecked by the audit team and found in compliance with the requirements.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	CL 08		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Validation Report: VCS Version 4.0 Non-Permanence Risk Report: Include sources to statements made in the report and provide the respective documents. 1. Project Management: f. Mitigation: Adaptive management plan in place. 2. Opportunity Cost: f. NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity. Clarify on the NPV of the Project Activity (Bamboo) 3. Natural Risks: Fire: "Furthermore EcoPlanet has more than a decade of experience in managing and effectively containing natural risk as is evidenced by successful operations in other locations."		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The PP has made the following changes with regards to the non-permanent risk report: 1. The VVB was already provided with this document: TUV – Ghana VCS Validation – Operational Documents – EcoPlanet Adaptive Management Plan 2021. A reference to this document has been added. 1. This request is not applicable. As per the VCS instructions "Where the majority of baseline activities over the length of the project crediting period are subsistence-driven, an NPV analysis is not required, but an assessment of the net impacts of the project on the social and economic well-being of the communities who derive livelihoods from the project area shall be undertaken. In the Bandai Hills Forest Reserve, the majority of the baseline activities over the length of the project crediting period are subsistence drive. An analysis of the net impacts of the project are provided in Section 2 of the PD. This section has therefore been updated to specify the above. 2. This statement does not affect the risk rating and added no value therefore it has been removed.		

Finding:	CL 08
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Respective information is included in the Non-Permanence Risk Report and supporting documents provided to the audit team. 1. Adaptive management plan/^{18/} VER Purchase Agreement, Bandai Hills Bamboo Reforestation Project/^{19/} 2. It is demonstrated that the majority of baseline activities over the length of the project crediting period are subsistence-driven and net impacts of the project on the social and economic well-being of the communities who derive livelihoods from the project area are positive. Hence a NPV analysis is not required. Under the demonstrated conditions the tool/^{20/} requires that “the project shall be assigned an opportunity cost score as set out in Table 3” which means section “d)”: “... or where baseline activities are subsistence-driven, net positive community impacts are demonstrated”. This results in the score “0”. The mitigation under h) has been verified. Legally binding commitment to continue management practices/^{06/}, section 11.2 → The risk rating needs to be adapted. 3. As the description for the “proven history of effectively containing natural risk) has been removed, the mitigation changes from 0.25 to 0.5. → The risk rating needs to be adapted. Conclusion: Due to the changes described above the risk rating in the Non-Permanence Risk Report changes from 5.5% to 10%. As this is also the minimum risk rating and the base for the buffer calculation no changes in the calculation of total VCU is required.
Corrective Action #2 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The two changes have been made to the risk assessment which has been updated to 10%.
DOE Assessment #2 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Respective information is included in the Non-Permanence Risk Report and the risk rating has been adapted.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	FAR 01		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The PP uses the following system of calculation of the area planted: The PP intends to plant 1.000.000 bamboo seedlings. The calculated space of each planted Bamboo clump is 20 m² (4m x 5m spacing). This indicates that 500 plants are planted on 1 ha. Due to the circumstance that there are existing solitary trees, rocky areas, small groups of trees etc. where planting of seedlings is not executed, 1 ha will, in many cases, include rather less than the 500 plants. The calculation of the area planted will therefore be based on the number of clumps planted rather than on the actual area size. This means, that on the available area of abt. 7372 ha, a calculated area of 3500 ha will be planted. Hence, the base for the carbon inventory is rather the number of plants than the actual area. The PP uses a specific forestry software which is presently under development to document the exact number of clumps planted, its survival status etc. At verification the audit team will have to verify the actual number of existing clumps by a sampling approach. At validation there was no detailed description, how this will be achieved. The PP needs to bear in mind, that the inventory as base of the carbon calculation needs to be verifiable.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>			
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>			
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Finding:	FAR 02		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	As literature on allometric equations on the specific bamboo species is sparse and not sufficiently reliable to compare with the project conditions, the PP developed a species specific allometric equation for the ex-ante estimation. To ensure accurateness and conservativeness the developed allometric equations is subject to re-assessed and verification at 1 st verification.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>			
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>			
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

APPENDIX II: ABBREVIATIONS

Abbreviations	Full texts
ARR	Afforestation, Reforestation and Revegetation
AFOLU	Agriculture, Forestry and Other Land Use
BAU	Business as usual
CAR	Corrective Action Request
CCB	Climate, Community & Biodiversity
CCBA	Climate, Community & Biodiversity Association
CDM	Clean Development Mechanism
CL	Clarification Request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CP	Certification Program // Crediting Period
DNA	Designated National Authority
EB	CDM Executive Board
ER	Emission Reductions
ETS	Emission Trading Scheme
FAR	Forward Action Request
GFC	Ghana Forestry Commission
GHG	Greenhouse gas(es)
GMO	Genetically modified organism
GS	Gold Standard
HCVs	High Conservation Values
IFM	Improved Forest Management
IPCC	Intergovernmental Panel on Climate Change
JNR	Jurisdictional and Nested REDD+
MP	Monitoring plan

MR	Monitoring Report
NDRC	National Development and Reform Commission
NPRA	Non-Permanence Risk Analysis
PD	Project Description
PP	Project Participant
PRA	Participatory Rural Appraisal
QC/QA	Quality control/Quality assurance
REDD	Reduced Emissions from Deforestation and Degradation
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VER	Verified Emission Reduction
VVB	Validation/Verification Body

APPENDIX III: REFERENCES

Reference	Document
/01/	01_Bandai Hills PD v. 1.5, 16.09.2022
/02/	01_Bandai Hills Non-Permanence Risk Report 01.07.22
/03/	03_Bandai Hills Reforestation Project Boundary
/04/	04_Bandai Hills GHG Calculations 27.05.22
/05/	05_Bandai Hills 50 Year Land Lease
/06/	06_EcoPlanet Bamboo WA II Benefit Sharing Agreement - Executed
/06a/	06a_Carbon Rights WA II
/07/	07_Shapefiles Forest 2012
/08/	08_Ghana REDD+ Strategy
/09/	09_Field Notes_2022
/10/	10_Attendance Register
/11/	11_2929 Findings - EcoPlanet Response
/12/	12_NB workflow forest
/13/	13_EcoPlanet Bamboo WA II Operating Agreement

Reference	Document
/14/	14_EcoPlanet Bamboo Org Chart 05.24.22
/15/	15_Land Allocation Bandai Hills & Bandai Hills_FC
/16/	16_Ecoplanet Bamboo Shortfall Areas
/17/	17_EcoPlanet Bamboo - Acceptance of Land Allocation 12.15.15
/18/	18_EcoPlanet Adaptive Management Plan 2021
/19/	19_Overview-and-collection-Forest-and-Wildlife-laws-Ghana
/20/	20_Constitution 1992
/21/	21_Waypoints_APR-22
/22/	A Commentary on the Bamboos (Poaceae: Bambusoideae) Thomas R. Soderstrom and Cleofe E. Calderon, 1979.
/23/	23_Ecoplanet Reforestation Plan WA II
/24/	24_Procedure 9. Complaints, Grievances, Disputes and Conflict Resolution
/25/	25_Camargo 03.2022 Allometric Equations for D.Asper
/26/	26_Camargo 03.2022 Allometric Equations for B.Textilis
/27/	Plantation Schedule
/28/	28_Gurmessa et al

Reference	Document
/29/	EcoPlanet Bamboo Ghana plantations, data provided from 2015 – 2018 internal monitoring.
/30/	30_CV-Bernard-Sadow-Baani-Bamboo-Plantation-Ghana
/31/	31_Curriculum Vitae CH Potgieter 2021
/32/	VER Purchase Agreement, Bandai Hills Bamboo Reforestation Project; 2021 (confidential)
/33/	33_WB Ghana Governance Scores
/34/	https://www.greenclimate.fund/countries/ghana
/35/	https://www.unredd.net/regions-and-countries/africa/ghana.html
/36/	https://earth.google.com/web/
	https://verra.org/
	https://registry.goldstandard.org/projects?q=&page=1
	https://cdm.unfccc.int/Projects/projsearch.html
	International Carbon Action Partnership (ICAP) - ETS Map (icapcarbonaction.com)
	https://americancarbonregistry.org/
	https://www.csaregistries.ca/albertacarbonregistries/home.cfm

Reference	Document
/37/	37_Ghana Forest Plantation Strategy_24_01_16_ forest threshold ghana
/38/	38_DM AR-ACM0003 - A/R Large-scale Consolidated Methodology Afforestation and reforestation of lands except wetlands, Version 02.0
39/	39_CDM AR-TOOL14 Methodological tool Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities, Version 04.2
/40/	40_CDM A/R Methodological Tool 17 - Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities, (Version 01.0.0)
/41/	41_biomassofblackpetungbamboo

APPENDIX IV: INTERVIEWS

Reference	Mean		Name	Organisation / Function
/IM01/	Visit	☐ Mr. ☒ Ms.	Camille Rebelo	EcoPlanet Bamboo/COO
/IM02/	Visit	☒ Mr. ☐ Ms.	Huge Broun	Forest Service Division – Ghana Forestry Commission/Director of Operations
/IM03/	Visit	☒ Mr. ☐ Ms.	Thomas Gyambrah	Climate Change Directorate – Ghana Forestry Commission/Manager Programs and MRV
/IM04/	Visit	☒ Mr. ☐ Ms.	Christian Potgieter	EcoPlanet Bamboo/GM
/IM05/	Visit	☒ Mr. ☐ Ms.	Emmlanim Bren	Forest Service Division Juaso/District Manager
/IM06/	Visit	☒ Mr. ☐ Ms.	Joseph Asomaning	Forest Research Institute of Ghana/ Head of National Tree Seed Centre
/IM07/	Visit	☒ Mr. ☐ Ms.	Emmanuel Ebanyenle	Forest Research Institute of Ghana/Head of Wood Industry and Utilization
/IM08/	Visit	☒ Mr. ☐ Ms.	James Aponsah	Forest Research Institute of Ghana/Nursery Manager
/IM09/	Visit	☒ Mr. ☐ Ms.	Abdulai Mohammed	EcoPlanet Bamboo/Silviculture Manager
/IM010/	Visit	☒ Mr. ☐ Ms.	Evans Donkor	XS3-Security/Operation Manager
/IM011/	Visit	☒ Mr. ☐ Ms.	Emmanuel Addo	Chief of Oseikrom Mankala

Reference	Mean		Name	Organisation / Function
/IM012/	Visit	☒ Mr. ☐ Ms.	David Galenu	Sub-Chief of Oseikrom Mankala
/IM013/	Visit	☒ Mr. ☐ Ms.	Kwame Aponsah	Linguist of Oseikrom Mankala
/IM014/	Visit	☒ Mr. ☐ Ms.	Nabil Birgobin	Musmet Ent/Manager
/IM015/	Visit	☒ Mr. ☐ Ms.	Mustapha Mohammed A.	EcoPlanet Bamboo/Finance Manager
/IM016/	Visit	☐ Mr. ☒ Ms.	Joices Ayitey	EcoPlanet Bamboo/Cook
/IM017/	Visit	☐ Mr. ☒ Ms.	Philomena	EcoPlanet Bamboo/Worker
/IM018/	Visit		A detailed list of further interviewees (Workers/Community Members/Employees) is available as reference but not publicly due to privacy concerns ^{/10/}	