BOOMITRA GRASSLAND RESTORATION IN EAST AFRICA THROUGH SOIL ENRICHMENT

Document Prepared by Earthood Services Limited

info@earthood.in

Report ID	VCS.VAL.23.102
Project title	Boomitra Grassland Restoration in East Africa Through Soil Enrichment
Project ID	3340
Crediting period	10-01-2019 to 09-01-2039
Original date of issue	30/11/2023

Most recent date of issue	01/07/2025
Version	3.0
VCS Standard Version	VCS Standard 4.5
Client	Boomitra Inc
Prepared by	Earthood Services Limited
Approved by	Individual at the validation/verification body who approved this validation report
Work carried out by	Team Leader (New): Ashok Kumar Gautam Team Leader (Old): Shreya Garg Technical Area Expert: & Validator: Nepolion Borah Local Expert: Virginia Njeri Trainee Validator: Tripti Pandey Remote sensing and GIS Expert: Waris Hooda Technical Reviewer: Shifali Guleria New TA Expert to TR (New): Sadaf Nazneen TA Expert to TR (Old): Parul Srivastava

Summary:

Provide a summary of the following:

- A description of the validation and the project

  Earthood Services Pvt. Ltd. (ESPL) has carried out the validation assessment of the project activity" Boomitra Grassland Restoration in East Africa Through Soil Enrichment" (VCS 3340). The project activity falls under sectoral scope 14, Agriculture Forestry and Other Land Use (AFOLU) type and category Agriculture Land Management (ALM) as per the VCS Standard, v4.5.

  This is a large-scale project involving better agricultural land management practices that undertakes the restoration action in the savannah grassland of East Africa (Kenya) through various sustainable grassland management practices especially through management of grazing activities which in accordance will help in maintain the soil carbon. Boomitra Inc is implementing the project, which is backed by EarthAcre Incorporated and various other implementing partners. To quantify the amount of greenhouse gas reductions achieved through this project, approved VCS methodology VM0042, v1.0 was used.

  The project emissions reductions were calculated in a transparent and cautious manner and made accessible in emission reductions calculation spreadsheets for validation. Total estimated ER for the entire crediting period from 10/01/2019 to 09/01/2039 are 93,371 tCo2e and average annual emission reductions are 4,669 tCO2e/year.

- The purpose and scope of validation

  This assignment is independent by a third party (Earthood) of proposed project "Boomitra Grassland restoration in East Africa through Soil Enrichment" VCS 3340 against all defined criteria set for the registration under standard, version 4.5. The validation is conducted using Earthood procedures which are developed in line with the requirements specified in the VCS Validation and Verification Manual v3.2. The purpose of the Validation is to confirm that the project and all related project documentation are in accordance with all rules and requirements of the VCS Standard v4.5. applied methodology (VM0042 – Improved Agricultural Land Management", version 1.0) and its associated tool.

- The method and criteria used for validation.

  The validation team has reviewed the project activity in accordance with the rules and requirements specified in the latest versions of VCS standard and checked the applicability of the project against the applied methodology and tools which includes the following:

  VCS Standard, version 4.5

  VCS Program Guide, version 4.4

  VCS Program Definitions, version 4.4

VCS validation and verification Manual, version 3.2

AFLOU Non-permanence Risk Tool, version 4.0

The project activity is found to be appropriately eligible under Project Scope 14 "Agriculture, Forestry, and other Land Use (AFLOU) and category Afforestation, Reforestation and Revegetation (ARR).

- The number of findings raised during validation.

  During the validation process 34 clarifications, 28 corrective actions were raised and successfully resolved. 2 FARs have been raised. All the findings raised along with the findings of validation team have been included in the report in Appendix VI.

- Any uncertainties associated with the validation.

  There were no uncertainties associated with the validation process.

- Summary of the validation conclusion

  In conclusion, it is Earthood's opinion that the project activity "Boomitra Grassland Restoration In East Africa through Soil Enrichment" VCS 3340, meets all relevant requirements for VCS standards and guidelines, and correctly applies the methodology VM0042 – The implementation of the project activity is resulting in estimations of total emission reduction of 93,371 tCO2e and annual average emission reductions of 4,669 tCO2e/year over its entire crediting period of 20 years spanning from 10/01/2019 to 09/01/2039. The total Project to be Verified Carbon Units calculated is **93,371 tCO2e** and average Project Verified Carbon Units calculated **is 4,669 tCO2e/year** till the project lifetime.

CONTENTS 1 INTRODUCTION 6

1.1 Objective 6
1.2 Scope and Criteria 6
1.3 Reasonableness of Assumptions 7
1.4 Summary Description of the Project 7

2 VALIDATION PROCESS 8
2.1 Method and Criteria 8
2.2 Document Review 9
2.3 Interviews 10
2.4 Site Visits 15
2.5 Resolution of Findings 16

3 VALIDATION FINDINGS 18
3.1 Project Details 18
3.2 Safeguards and Stakeholder Engagement 38
3.3 Application of Methodology 58
3.4 Non-Permanence Risk Analysis 106

4 VALIDATION OPINION 114
4.1 Validation Summary 114
4.2 Validation Conclusion 115

APPENDIX I: COMMERCIALLY SENSITIVE INFORMATION 120

APPENDIX II: ABBREVIATIONS 121

APPENDIX III: COMPETENCE STATEMENT 122

APPENDIX IV LIST OF DOCUMENTS REFERRED 128

APPENDIX V: ADAPTIVE MANAGEMENT PLAN 136

APPENDIX VI: AUDIT FINDINGS 139

1 INTRODUCTION

1.1 Objective

Boomitra Inc contracted Earthood to undertake the validation process for project activity "Boomitra Grassland Restoration in East Africa through Soil Enrichment" VCS 3340 which is under the scope of VCS validation/5/.

The objective of the validation is to is undertake an independent third-party assessment and to approve that "Boomitra Grassland restoration in East Africa through Soil Enrichment" VCS 3340 and all the related project documentation & support documents are in accordance with rules and requirements of the VCS Standard v4.5/4/.

Especially the project's baseline, monitoring plan, and the quantification of emission reduction & removal and non-permanence risk analysis is in line with relevant VCS requirements and host Country criteria are validated to confirm that the project design, as documented, is comprehensive and practical and meets the identified criteria. Independent third-party validation is a requirement for all VCS projects and is mandatory to provide assurance to the verra and other stakeholders of the quality of the project and its projected Verified Carbon units (VCUs) generation.

1.2 Scope and Criteria

The scope of the services provided by the Earthood for the project is to perform VCS validation of the project "Boomitra Grassland Restoration in East Africa through Soil Enrichment" VCS 3340. The scope of validation is to assess the claims and assumptions made in the project description (PD) against the VCS Standard Version 4.5, applied methodology VM0042 and its associated tool and other relevant rules and requirements established for VCS project activities.

Validation Process and Methodology

The validation process is undertaken by a competent validation team and involves the following:

- The desk review of documents and evidence submitted by the project participant in context of the reference VCS guidelines issued by Verra.
- Validate whether the project activity meets the requirements of VCS standard v4.5, VCS program guide v4.4 & VCS program definition v4.4.
- Evaluate whether the baseline and monitoring plan are in conformance with the applied VCS methodology VM0042, v1.0.

- Undertaking/conducting site visit, interview, or interaction with the representative of the project participant,
- Reporting audit findings with respect to clarification and non-conformities and the closure of the findings, as appropriate and
- Preparing a draft validation opinion based on the auditing finding and conclusions.
- Technical review of the draft validation opinion along with other documents as appropriate by an independent competent technical review team
- Finalization of the validation opinion (this report).
- An independent technical review team review the validation report made by the validation team. After the final report the final report is accepted by the technical reviewer it is then approved by Earthood which is processed further according to the VCS procedures.

  Earthood validated utilizing a risk-based method, focusing on the significant risk of meeting the qualification criteria and the ability to create VCUs. The validation is not intended to provide any advice to the client. However, explicit requests for clarification and/or corrective action may provide input for project design improvement.

1.3 Reasonableness of Assumptions

In accordance with the VCS standard v4.5 para 4.1.2 and 4.1.8, the level of assurance of this validation report is reasonable. VVB has reviewed sufficient evidence to verify the project design, ex-ante and monitored parameters, monitoring plan and estimated emission reductions and removals calculations. Further clarifications were asked, and all the discrepancies found during the validation assessment have been raised as audit findings, and 34 clarifications, 28 corrective actions were raised and successfully resolved. 02 FARs have been raised. All the findings raised along by the findings of validation team have been included in Appendix VI, of this report.

1.4 Summary Description of the Project

The AFOLU project initiated by Boomitra Inc." Boomitra Grassland restoration on East Africa through Soil Enrichment" is Carbon reduction/removal project, where through introducing improved grassland management practices and sustainable grazing practices, the project proponent will significantly help the grasslands of the region and restore carbon to their soil, creating carbon removal while improving the soil health. The Project area instances for this project is Kenya. The project area has been characterized semi-arid and might turn into arid zones and these areas are prone to dryness to the extent that pastoral activities will eventually become difficult over those regions. Land degradation due to overgrazing is a prominent issue which has an adverse impact on soil carbon, and it is known that grazing practises is the primary land use activity in the savannas due to which the soil carbon has been prominently altered and often degraded. A gradual declination in Kenya's grassland has been observed especially during

1982 to 2006, 18% of grassland has been degraded in Kenya. Few of the major attributes contributing to it would be anthropogenic activities such as overgrazing, which results in loss of vegetation cover and soil fertility, increased erosion, and overall decreased grassland productivity. Savanna grasslands are in tropical region that is subjected to prevailing conditions of low soil carbon. These factors altogether along with overgrazing results in a highly dynamic environment, and the agriculture sector of the country is often subject to severe disruptions /41//42//43//44//45//46/.

The project aims to assist pastoralist communities in Kenya in adopting practices that support the sustainable development of East Africa's savanna grasslands. These regions, characterized by arid and semi-arid conditions, are increasingly vulnerable to the impacts of frequent droughts. Semi-arid areas are at risk of transitioning into arid zones, while already arid regions face the threat of becoming unsuitable for pastoral activities in the near future. Overgrazing by livestock and wildlife has exacerbated land degradation, adversely affecting soil organic carbon (SOC) levels, a critical component for maintaining soil health and fertility. Since grazing dominates land use in the savannas, interventions to address this challenge are essential.

The project proposes the introduction of modern advancements and technological solutions to promote sustainable grassland management practices. These include rotational grazing, livestock and water management, and other targeted grassland restoration activities. Such interventions aim to regenerate vegetation, enhance carbon sequestration, and restore soil fertility, thus improving SOC levels. In addition, the initiative seeks to mitigate further land degradation, enhance productivity for pastoralists, and create carbon removal benefits. The project also incorporates carbon credit payments to directly improve the livelihoods of participating communities.

By mobilizing pastoralists to adopt proven sustainable practices, this project is expected to yield significant environmental, community, and biodiversity benefits. It aligns with and contributes to several United Nations Sustainable Development Goals (SDGs), including SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work and Economic Growth), SDG 13 (Climate Action), and SDG 15 (Life on Land). The anticipated outcomes include increased SOC, improved grassland productivity, enhanced biodiversity, and strengthened resilience of local communities against climate challenges.

2 VALIDATION PROCESS

2.1 Method and Criteria

The validation process involves the following.

- A review of the data and information presented submitted by the project proponent in context of the reference VCS rules and guidelines to verify their completeness.
- Undertaking site visit, interview, or interactions with the representative of the project proponent, project employees and local stakeholders.
- A review of the monitoring plan, the monitoring methodology including applicable tools and, where applicable, the applied standardized baseline; and the quality assurance and quality control procedures.
- A review of calculations and assumptions made in determining the GHG data and emission reductions.
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.
- Site inspections were carried out including interviews with representatives of PP. Sampling approach followed by the validation team has been given in 2.4 of this report.

2.2 Document Review

The VCS validation of the project was performed by Earthood through the document review and on-site visit completed in line with the requirements specified in the VCS standard, VVB standard, VVB manual and applied methodology VM0042 and other VCS documents. Additionally, cross checks were performed for information provided in the project description (PD) using other independent source of information. The list of documents reviewed during the validation process is provided under appendix III of this validation report. Project compliance with national laws and regulations were reviewed following VCS standard and applied methodology. On-site inspection was carried out by Team Members that covered interviews with PP and relevant stakeholders, physical inspection of sampled farmers. Local Expert confirmed the project details against the local rules and regulation. Below is the details of validation team members and technical reviewer.

Validation team member.

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of VVB or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Validation findings
1.	Team Leader (New)	IR	Gautam	Ashok	Central Office	Y	N	N	Y
2.	Team Leader (Old)	IR	Garg	Shreya	Central Office	Y	Y	Y	Y
3.	TA Expert (14.1) & Validator	IR	Borah	Nepolion	Central Office	Y	Y	Y	Y
4.	Local Expert	EI	Njeri	Virginia	Central Office	N	Y	Y	N
5.	Trainee Validator	IR	Pandey	Tripti	Central Office	Y	N	N	Y
6.	RS & GIS Expert	IR	Hooda	Waris	Central Office	Y	N	N	Y

Technical reviewer and approver of the validation report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g., name of central or other office of VVB or outsourced entity)
1.	Technical Reviewer	IR	Guleria	Shifali	Central Office
2.	TA Expert (14.1) to TR (New)	IR	Nazneen	Sadaf	Central Office
3	TA Expert (14.1) to TR (Old)	IR	Srivastava	Parul	Central Office
4.	Approver	IR	Singh	Kaviraj	Central Office

2.3 Interviews

The team members from Earthood validation team visited the project site (on-site) and conducted the site inspection from 27/10/2023 to 28/10/2023. The interviews were carried out with the PP, implementing partners, representatives from cattle owners, Ranchers & animal herders sampled for site visit, and other relevant stakeholders. A team from Boomitra Inc., have *accompanied the VVB team members throughout the site visit and were present during each of the site inspection and interviews.* The following is the list of people interviewed.

No.	Interviewee			Date	Subject	Team member(s)
	Last name	First name	Affiliation			
1.	T. R	Chethan	Boomitra Director - Carbon	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
2.	Noi	Lankas	Boomitra representative	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
3	Parusan	Barison	TWF	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
4	Parmision	Nickson	TWF	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg ,Virginia Njeri and Nepolion Borah
5	Mulinge	Ruzabeth	Director Machakos Ranching	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah

6	Jepchumba	Caroline	Project manager Earthcare	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
7	Tuleto	Moses. M Mathenge	General Manager	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
8	Mbithi	Jackson	Machakos ranching Co.Ltd.	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
9	Misle	Rose	Machakos Ranching Livestock Manager	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
10	Musyoki	Paur	Ranch/Manager	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah

11	Patita	Nakamunu	Head of Projects & Co-Founder, EarthAcre, Kenya and Committee Vice Char of Athi-Kapiti Wildlife Conservancies Association (AKWCA),	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
12	Onqu	Collins Oranga	Executive Farm Operation Boomitra	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolian Borah
13	Maina	Ann	Boomitra Project Lead.	27/10/2023	Project design and implementation, documentation and management, objectives, project additionality	Shreya Garg, Virginia Njeri and Nepolion Borah
14	Thenya	*Elizabeth*	Animal herder – Machakos Ranch	27/10/2023	Animal herders – Boomitra grassland restoration I n east Africa through soil enrichment	Shreya Garg, Virginia Njeri and Nepolion Borah
15	Nzioka	Issac	Animal herder – Machakos Ranch	27/10/2023	Animal herders – Boomitra grassland restoration I n east Africa through soil enrichment	Shreya Garg, Virginia Njeri and Nepolion Borah
16	Mutia	Joseph	Animal herder – Machakos Ranch	27/10/2023	Ranchers – Boomitra grassland restoration I n east Africa through soil enrichment	Shreya Garg, Virginia Njeri and Nepolion Borah

17	Michael	Mbithi	Lisa Ranch & game sanctuary (Machakos)	28/10/2023	Ranchers – Boomitra grassland restoration I n east Africa through soil enrichment	Shreya Garg, Virginia Njeri and Nepolion Borah
18	Kasanga	David	Kasnga Ranch, Lukeniya hills., Member of AKWCA	28/10/2023	Ranchers – Boomitra grassland restoration I n east Africa through soil enrichment	Shreya Garg, Virginia Njeri and Nepolion Borah
19	Klaho	Francis	Lisa Ranch & game sanctuary (Machakos)	28/10/2023	Animal herders – Boomitra grassland restoration I n east Africa through soil enrichment	Shreya Garg, Virginia Njeri and Nepolion Borah
20	Moorthy	Aadith	Co-founder Boomitra Inc	Virtual meet	Remote Sensing and SOC Model verification, Roth C model Demo, ATBT document Review	Shreya Garg, Waaris Hooda and Nepolion Borah
21	Clark	David	RS expert	Virtual meet	Remote Sensing and SOC Model verification, Roth C model Demo, ATBT document Review Discuss about data analysis, Evidence of project activities and documentation	Shreya Garg, Waaris Hooda and Nepolion Borah

22	Jain	Rishabh	RS expert	Virtual meet	Remote Sensing and SOC Model verification, Roth C model Demo, ATBT document Review Discuss about data analysis, Evidence of project activities and documentation	Shreya Garg, Waaris Hooda and Nepolion Borah

2.4 Site Visits

The site inspection took place from October 27 to October 28 in the year 2023. During the on-site visit, interviews with PP and implementing partners were conducted to discuss and conform project details, implementation plan, monitoring plan, baseline scenario and other project details. The list of people interviewed are provided in section 2.3 of the validation report. The interactions included assessment of project development and design, implementation, and operation as per the PD /1/. Discussion on livestock grazing pattern with Cattle owner, Ranchers and Animal herders, any risk identified and addressed within project boundary, existing laws and regulations, baseline scenario, and monitoring and data collection. Process of stakeholder identification, consultations, and grievance mechanism. The reviewed evidence along with other supporting documents were also provided to the validation team for assessment by the PP as listed in appendix III. The records of interview conducted has been maintained in the form, photographs taken at project site and attendance sheets /18/19/20/21/22/.

Representatives from following were interviewed during site visit.

1. Boomitra Inc
2. EarthAcre Incorporated
3. Lisa Ranch (Ranchers, Cattle owners and herders)
4. Kasanga Ranch (Ranchers, Cattle owners and herders)
5. Game sanctuary (Ranchers, Cattle owners and herders)
6. Athi kapiti Wildlife Conservancies Association (AKWCA)

The project location is in East Africa and this grouped project includes all types of grasslands in Kenya. The audit team interviewed each of the three participating ranchers in the first project Instances after considering the total number of ranchers in the first project Instant which also the total Ranches mentioned in PD. Consequently, a sample plan is not necessary. The list of ranches is given below.

1.) Machakos Ranch

2.) Lisa Ranch

3.) Kasanga Ranch

2.5 Resolution of Findings

The process for raising the findings (corrective actions, non-conformities, or other findings) by the validation team is carried out after thoroughly reviewing supporting documents and evidence shared by project proponent. Observations of site visit inspection was also raised as findings. As an outcome of the validation process, the validation team can raise different types of findings. As outcome of the validation process, the validation team can raise different types of findings as per the following understanding:

A Clarification Request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met:

Where a non-conformance arises the team leader shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emissions reductions.
- The VCS standard, methodology and modules requirements have not been met; - there is a risk that emission reductions cannot be monitored or calculated.
- The validation process may be halted until this information has been made available to the team leader's satisfaction. Informed or clarification provided as result of a CL may also lead to a CAR.

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 following validation assessment.

During the validation process, Total 34 CLs and 32 CARs were raised and resolved satisfactorily. The list of CARs/CLs raised, and the response provided, the mean of validation, reasons for their

closure and references to correction in the relevant documents are provided in Appendix VI of this report 3 FARs have been raised.

2.5.1 Forward Action Requests

During the VVB assessment of “Boomitra Grassland restoration in East Africa through soil enrichment” in total 34 Clarification (CL), 32 corrective action request (CAR) and 3 Forward Action Request (FAR) were raised. Based on the raised CL and CAR during the audit findings, this FAR is raised. Remote sensing's overall approach for validation is accurate and aligned with the project's objectives and methodology however, it's crucial to specifically examine the following points during verification:

1. Ground samples are not collected by PP during validation; instead, PP intends to conduct groun d sampling independently during verification for the months of January and February. In additio n to this PP will be required to explicitly provide a data collection plan and number of samples c ollected within the project activity area in the technical document.
2. A detailed plan and information regarding the bias correction of Emission Reductions (ERR) are needed. This correction should account for the difference between RothC estimations resulting from project activity intervention and those obtained from remote sensing data or vice versa for baseline scenario.
3. As a result of temporal alignment issues observed in satellite data, there's a possibility of overe stimations. PP is requested to furnish a revised model plan addressing the temporal alignment of satellite data to mitigate these issues.
4. Approach soil data information for modelled soil moisture data or improved soil data informatio n either ground based or other remote sensing data.
5. Regrettably, due to a lack of available data, a comprehensive assessment of the specific details regarding input errors couldn't be conducted. This needs to be critically examined at the time of verification.
6. Information and data for the comparison between ALOS-2 modeled data and bias-corrected dat a derived from Sentinel-1 predictions is needed at the time of verification.

The delineation challenges within the Kasanga ranch due to forested areas might lead to potential overestimations in ERR calculations. A thorough pixel-level examination will be crucial during the verification process to address this possibility.

Also, the second FAR was raised for public comment during the VVB assessment based on provided proof of initiation of conversation between the PP and the local stakeholders, the CL#24 and CL#25 are closed and FAR#02 is initiated. As mentioned by the PP, it is very important to include the stakeholders in the project as participants if they are interested and all the issues raised by the stakeholders should be satisfactorily resolved before the verification.

3 VALIDATION FINDINGS

3.1 Project Details

The project Boomitra Grassland restoration in East Africa through soil enrichment is an AFOLU project and falls under VCS sectoral scope 14 Agricultural Land Management (ALM) activity type. This is a grouped project, and its first project activity instance is Kenya. It involves ecosystem restoration of grasslands by introducing multiple grazing (wildlife and livestock) along with rotational grazing and improved agriculture land management practices. The communal farmers/ranchers practice unmanaged grazing of cattle. The project introduces concept of rotational grazing. The project design includes allowing cattle to graze in grazing land while resting land is kept restoring. The section 1.12 of the PD described the project activity and improved land, and livestock management practices adopted in this project along with other activities of the project.

Validation team finds the information in the PD /1/ consistent with the observation of audit team and outcome of the interviews with Project Proponent (PP), Ranch owners, cattle owners animal herders and other implementing partners during the on-site visit.

<table>
<tr><th>Item</th><th>Evidence gathering activities, evidence checked, and assessment conclusion</th></tr>
<tr><td>Audit history</td><td>First Validation.

No previous Audit history found

Validation for this VCS project was conducted by Earthood Services Limited, the crediting period for this project is for 20 years from 10-January-2019 to 09-January-2039 which is renewable twice.

<table>
<tr><th>Audit Type</th><th>Validation Period</th><th>Number of Years</th><th>Validation/Verification body name</th><th>Crediting period</th></tr>
<tr><td>Validation</td><td>27-07-2023 to 28-11-2023</td><td>20</td><td>Earthood</td><td>10-January -2019 to 09-January-2039</td></tr>
</table>
</td></tr>
<tr><td>Sectoral scope</td><td>Sector 14. Agriculture, Forestry, and other Land Use (AFLOU)</td></tr>
</table>

AFOLU project category, if applicable	Agriculture Land Management (ALM)
Project activity type	This is a group project.
General eligibility of the project to participate in the VCS Program	The "Boomitra Grassland Restoration in East Africa through Soil Enrichment project" follows all the scope listed in the Scope of the VCS Program in Section 2.1.1 of VCS standard v4.5/5/. The project excludes all the activities that involve generation of GHG emission, therefore, assuming to have generated GHG emissions primarily for the purpose of their subsequent reduction, removal, or destruction. The project also excludes all the project activities under the circumstances indicated in Table 1, mentioned in section 2.1.3 of VCS standard v4.5/5/. It focuses on reducing/removing the emissions from one of the seven greenhouse gases, as specified in Section 3.3.3 of the validation report. The project excludes any activities that generate GHG emissions, operating under the assumption that any emissions generated are solely for subsequent reduction, removal, or destruction purposes. The grouped project activity Agriculture land management (ALM) across savannah grassland of East Africa, Kenya/18//24/. The project activity confirms the VCS pipeline listing deadline as the project was listed on the VERRA registry on 14/10/2023. and is aligned with the section 3.8.2 of VCS Standard v4.5 quoting "AFOLU projects shall initiate the pipeline listing process (as set out in the Registration and Issuance Process) within five years of the project start date. The submission of the project will be also done before completion of five years from the start date of the project i.e., 10-January-2019 adhering to the section 3.8.4 of the VCS standard version v4.5/5/ stating "All other AFOLU projects shall complete with at least one of the following in relation to project start date". The project was open for public comment period from 02-August-2022 to 09-September-2022 which was informed from the registry webpage post which the opening meeting was conducted between the PP and VVB/92/. Thus, project activity conforms to the pipeline listing requirements in

accordance with para 4.1.5 of the VCS Standard v4.5/5/.

The project meets all requirements, including the pipeline listing deadline, open meeting with the VVB, and validation deadline. It utilizes the VCS approved applied methodology VM0042 v1.0 /8/, which aligns with VCS requirements and does not impose any scale or capacity limits. It is not a fragmented part of a larger project or activity and operates according to principles outlined in Section 2.2.1, derived from ISO 14064-2. The project ensures relevance by selecting GHG sources, sinks, reservoirs, data, and methodologies that meet specific user requirements. It maintains completeness by incorporating all relevant GHG emissions and removals, supported by comprehensive criteria and procedures. Consistency is maintained to enable meaningful comparisons among GHG-related data, while efforts are made to minimize bias and uncertainties to enhance accuracy. Transparency is prioritized, providing sufficient and relevant GHG-related information to enable confident decision-making by users. Conservative assumptions, values, and procedures are employed to prevent potential overestimation of GHG emission reductions or carbon dioxide removals. The methodology does not impose any scale and/or capacity limits. This project is not any fragmented part of a larger project or activity. The eligibility criteria based on the applicability condition of applied methodology VM0042v1.0 is applied efficiently, and the assessment team has reviewed these criteria based on applied methodology VM0042v1.0 /8/.

The methodology does not impose any scale and/or capacity limits. This project is not any fragmented part of a larger project or activity.

VVB assessment confirms that the project meets key eligibility criteria. It fulfills the requirement under the Kyoto Protocol for greenhouse gas removals by sequestering CO2 through soil carbon storage via rotational grazing, a proven method to enhance soil carbon in grasslands. The project complies with VCS methodology VM0042 (version 1.0)/8/ for improved agricultural land management and falls within the scope of the VCS program, as it is not part of any excluded categories. The criteria for Jurisdictional REDD+ requirements and ozone-depleting substances are not applicable, as the project is neither a Jurisdictional REDD+ program nor involves ozone-depleting substances/92/.

	VVB assessment confirms that the project qualifies under the Agricultural Land Management (ALM) activities outlined in Annex 1 of the VCS standard V4.5/5/, specifically under the Improved Grassland Management (IGM) category. By adopting sustainable grazing practices, the project demonstrably increases soil carbon stocks and reduces net GHG emissions in grassland ecosystems. Additionally, the project avoids degrading hydrological functions or negatively impacting native ecosystems. A detailed land use and land cover (LULC) analysis verified that the area has not been cleared of native ecosystems within the 10 years preceding the project's start date/24/. The project supports the development of native ecosystems and water resource conservation. It complies with VCS listing requirements, has proceeded to validation, and uses the approved methodology VM0042 version 1.0/8/, which meets all VCS criteria without scale or capacity limitations. Furthermore, the project is not a fragmented part of a larger activity.
AFOLU project eligibility, if applicable	This project qualifies Agriculture land management activities category that increase carbon stocks in soils by adopting sustainable grassland management practices. And the project "Boomitra Grassland Restoration in East Africa through Soil Enrichment Project" is categorized under Improved Grassland Management (IGM) category which includes practices that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks. Based on two sets of analysis have been done to check LULC variations among the participation farmers. Where first set is done using MODIS/Terra Land Cover Types (500 m resolution) data/24/, and due to its coarse spatial resolution and lack of data for region for time point, there were some issues with classifying the farmer lands. Therefore, GLAD Global Land Cover and Land Use Change dataset which has 30-m spatial resolution/24/ was used to find that all the project participant ranches remained grasslands. Even with this set of datasets there were some issues like lack of satellite data for some of the time series. Therefore, the land records and history of the usage of the land were identified/18/. During this analysis it was found that all the project polygons remained grasslands before and after the project implementation and in these lands, there was no clearing of native

	ecosystems that took place at least 10 years prior to the project implementation. As mentioned in section 2.4.3 of PD/1//18//60//66/. The assessment team assessed that this project supports pastoralists in Kenya to adopt sustainable practices aimed at preserving and restoring the savanna grasslands of East Africa. These arid and semi-arid regions face frequent droughts, with semi-arid areas at risk of becoming arid and arid zones becoming unsuitable for pastoral activities. Overgrazing, a prevalent issue in these regions, has significantly degraded soil carbon levels. The project addresses this challenge by equipping communities with modern tools and sustainable grassland management techniques, including rotational grazing and livestock and water management. These activities aim to enhance soil carbon sequestration, regenerate vegetation, restore soil fertility, and improve soil organic carbon (SOC) levels/94/. Additionally, the project directly benefits pastoralists through carbon credit payments, improving their livelihoods while preventing further grassland degradation and boosting productivity. Non-permanence risk report has been prepared by the PP and was reviewed by the VVB as per VCS Requirement and Non-permanence risk tool/79//80//81/.
Transfer project eligibility, if applicable	This section is not applicable for this project as neither been submitted to any other GHG Programs and nor been rejected or registered by any other GHG programs.
Project design	This is a grouped AFOLU project aims at involving multiple project instances within the specified project boundary, which involves Agricultural land management (ALM) as project activity as mentioned in the PD/1/. During validation, the grouped project has already formulated project instances, and additional new instances will be integrated within the geographic confines of the project area, encompassing the Kenya, East Africa as described in section 1.13 of PD/1/. The project, currently in its initial phase total of 3 land parcels or polygons, encompassing 9033[1] ha area is included. These initial project

[1] This area has been calculated using open-source software QGIS's EPSG:6933 as Coordinate Reference System (https://epsg.io/6933.Accessed on 5 Aug)

instances have been implemented in savannah grassland of Kenya, East Africa, as confirmed from the GIS assessment of the Merge KML files /93//53/.

The Grouped project design for Project follows all the criteria of baseline and additionality (section 3.6.10 to 3.6.15):-

The baseline scenario is established across the entire geographic scope of the project region where project activities are executed. For any new project areas, the regional baseline scenario will conform to the baseline identified in section 3.4 of PD /1/, employing the " The assessment conducted as per the VM0042 methodology, identified unsustainable grazing practices as the baseline scenario for this project, significantly contributing to grassland degradation in East Africa. Without intervention, overgrazing, human-wildlife conflicts, and ecosystem decline would persist. Surveys and interviews conducted with ranchers and pastoralists from 2016 to 2018 (t=-3) revealed continuous, unplanned grazing and overstocking as dominant practices, leading to soil erosion, biodiversity loss, and conflicts with wildlife. Historical data confirmed that surveyed ranches had been grasslands for over 15 years, with no synthetic fertilizers, irrigation, or controlled burning used. Observations of Lisa Ranch, Lukenya Ranch, and Machakos Ranch highlighted the urgent need for sustainable practices to address degradation. To ensure consistency, baseline assessments will be updated every 10 years per VM0042 methodology, aligning new activity instances with established baseline scenarios to maintain long-term project relevance."

According to the VVB assessment, the baseline scenario aligns with the VM0042 version1.0 criteria for baseline scenario/8/.

The project satisfies the eligibility criteria for new project area instances based on section

Eligibility Criteria	Compliance	Means of Validation
Meet the applicability conditions set out in the methodology applied to the project.	As per VM0042 version 1, each new project activity instance shall demonstrate	VVB has reviewed the PD section 3.2 /1/ and confirms that project activity is found to be fulfilling all the applicability conditions set out in Applied methodology VM0042 v1.0/8/

		compliance with the applicability conditions set out in the methodology. See section 3.2 of the PDD how this project meets the applicability conditions.	as assessed by the VVB under Section 3.3.2 below. New project instances (PIs) added will be checked against the applicability condition of the methodology, the condition is found to be appropriate as per section 3.6.16 and 3.6.17 of the VCS Standard/5/.
	Use the technologies or measures specified in the project description. Apply the technologies or measures in the same manner as specified in the project description.	All the new project activities shall implement one of the activities mentioned in the project activity description in Section 1.12 of the PDD. Each project activity instance shall adhere to the technology specifications (mentioned in methodology / standard) employed by project activity. See section 1.11	The VVB has reviewed PD Section 3.2 /1/ and confirms that the project activity meets all applicability conditions outlined in the Applied Methodology VM0042 v1.0/8/, as assessed by the VVB in Section 3.3.2 below. VVB has assessed section 1.12 of PD/1/ through desk review, GIS assessment /93/ and site-visit/95/.

		for more details on eligible project technologies.	
	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	Each instance should clearly define the baseline scenarios comprising of unsustainable agriculture practices and related information in the PDD.	The assessment team assessed the opted baseline scenario and applicability condition of the applicable methodology VM0042 v1.0 /8/ which is aligned with the PD /1/. The inclusion of new PAI will be done on the applicability condition and baseline scenario including geographical boundaries in context.
	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area. For example, the new project activity instances have financial, technical and/or other parameters (such as the size/scale of the instances) consistent with the initial instances, or face the	Each new Project Activity Instance shall demonstrate additionality as per methodology and VCS standard requirements.	The assessment team reviewed the first PAI and assessed the baseline condition and additionality using applied methodology VM0042 v1.0 which explained in section 3.3.4 & 3.3.5 of validation opinion.

	same investment, technological and/or other barriers as the initial instances		
	Occur within one of the designated geographic areas specified in the project description.	Each new PAI will be located within the same geographic area, as described	The VVB has assessed the geographic area of the first PAIO through on-site visit assessment /95//24/, literature review/95/, and through GIS assessment/93/
	Conform with at least one complete set of eligibility criteria for the inclusion of new project activity instances. Partial conformance with multiple sets of eligibility criteria is insufficient.	New Project Activity Instances shall comply with the full set of eligibility criteria for the inclusion of new project activity instances in this section. The selected lands are grasslands prior to project initiation and will remain as grasslands during the project lifecycle. A detailed Land Use/Land Cover (LULC) analysis has been carried out and is available in	The VVB team reviewed all the eligibility criteria in PD/1/ and was satisfied with the explanation.

		Section 3.4 of the PDD	
	Be included in the monitoring report with sufficient technical, financial, geographic, and other relevant information to demonstrate conformance with the applicable set of eligibility criteria and enable evidence gathering by the validation/verification body.	Each new Project Activity Instances shall have monitoring plans that define technical, financial, geographic, and other relevant information. A detailed monitoring plan and other relevant information has been provided in Section 5 of this PDD.	The VVB team reviewed all the eligibility criteria in PD and was satisfied with the information. /1/
	Have evidence of project ownership, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance (i.e., the date upon which the project activity instance began reducing or removing GHG emissions).	New project activity instances shall demonstrate ownership by the project participant, from the start date of the project activity instance. See ownership section (1.8) of PDD for more information.	The VVB has assessed the ownership document/59//60//65//66// and was satisfied that ownership of each new PAI is secured in the same way as described in section 1.8 of PD/1/.

	Have a start date that is the same as or later than the grouped project start date.	All the new project instances shall provide evidence that the activities started after the group project start date. See start date section (1.9) for more information.	The group project activity involves ALM activity. The start date of the project activity is 10th January 2019. The same has been taken for crediting period start date, which is verified by the VVB, and the justification is provided in the validation report in project start date, section of validation finding.
	A period in which they were added to the grouped project, through to the end of the total project crediting period.		The start date and crediting period has been reviewed based on VCS standard v4.5/1/ and the applied methodology VM0042 v1.0 /8/
	Not be or have been enrolled in another VCS project.		Any other VCS project through site visit assessment/95/, GIS assessment/93/ and through checking on verra registry/92/
Project ownership	Boomitra, in collaboration with implementation partners, promotes sustainable grassland management by providing training and technical support to ranchers, aiming to encourage behavioral changes in grazing practices. Participation in the project is entirely voluntary, with ranchers joining after thorough discussions facilitated by local partners. At the time of validation, EarthAcre serves as the implementation origination partner, responsible for identifying ranchers, providing training on sustainable grazing practices, ensuring adherence to FPIC protocols, and conducting standardized monitoring of grazing management. Additionally, AKWCA acts as the intervention coordinator for specific locations, implementing and		

	coordinating rotational grazing practices in areas like Athi Kapiti /23//59//63//70//65//66/. The project spans grasslands in Kenya, encompassing community and privately owned lands. Kenya's grasslands, under diverse land tenure systems, include private, community, and government lands, with ownership models uniformly governed by law. Three primary land ownership scenarios are involved: community-managed and owned lands, privately owned lands with communal management, and individually owned private lands. The first project instance onboarded only privately owned grasslands covering 9,033 hectares across three ranches: Lisa Ranch, Lukenya Ranch, and Machakos Ranch. Landowners enter legally binding agreements with Boomitra via AKWCA to assign rights to carbon credit generated from their lands. The agreements ensure permanence, with a project duration of 30 years, renewable every 10 years, and clarify revenue sharing mechanisms. These agreements are carefully explained to ranchers in English and Swahili to secure informed consent. During the crediting period, Boomitra plans to onboard additional land, including community-owned parcels, to expand the project to 11,291 hectares. Monitoring and verification will adhere to uniform standards across all land ownership scenarios, ensuring compliance with VCS Standard V4.5./4//18//23//59//63//70//65//66/.
Project start date	The project start date is recognized as January 10, 2019, marking the initiation of improved grazing management practices by the first participating rancher under the guidance of ground staff and intervention partners. This start date is substantiated by training records, monitoring data, and payment receipts for labor activities, such as digging holes and installing fencing for paddock demarcation. These paddocks were crucial for implementing rotational grazing, allowing rest periods for forage regrowth, enhancing livestock health, and improving productivity. While January 10, 2019, signifies the commencement of GHG emission reductions and removals (ERRs) through improved practices, it is important to note that start dates vary across ranches. ERR calculations are uniquely

	tailored to each ranch based on their respective start dates, as reflected in the revised ERR sheet. This individualized approach ensures accurate estimation of carbon reductions and removals across all participating lands. /53//68//69/.
Project crediting period	The crediting period is established based on VCS standard v4.7/4/ and is line with the project start date mentioned in PD v4.0 section 1.9/1/. The crediting period for this grouped project is 10-January-2019 to 09-January-2039
Project scale	The project scale is "Large" as the estimated GHG removals are above 300,000 tCO2e/year.
Likelihood of achieving estimated GHG emission reduction or removals	93,371 tCO2e
Technologies and measures implemented by the project activity or activities	The grouped project focuses on implementing and promoting sustainable grassland management practices, with rotational grazing as the principal activity. All project activities adhere to the eligibility criteria outlined in Section 3.6.16(2) and (3) of the VCS Standard v4.5/4/. Rotational grazing transitions pastoralists and landowners from continuous to rotational grazing, enhancing forage availability, soil fertility, and biodiversity while reducing environmental degradation. Key practices include dividing grasslands into grazing zones to prevent overuse, allowing vegetation recovery, and improving soil structure for increased water retention and carbon sequestration/1//40//29//89//90//94/. The project also incorporates water management, livestock management, capacity-building programs, and grassland biodiversity conservation. These activities collectively improve soil organic matter, promote ecosystem sustainability, and increase carbon sequestration. Subsidiary practices vary among participants based on local conditions, ensuring tailored and effective implementation across all project locations. The project adopts a phased approach to progressively integrate additional sustainability practices, such as water conservation and biodiversity

	enhancement, over its crediting period. Initially focusing on rotational grazing, water management, and livestock management, these activities aim to restore grassland ecosystems while promoting carbon sequestration. Livestock management involves optimizing stocking rates through detailed plans developed with input from local experts and pastoralists. Water management initiatives, including constructing ponds and water points, enhance soil moisture and reduce erosion, improving grass growth*/89//90/*. Capacity-building programs ensure community participation, while multi-species grazing integrates livestock and wildlife to foster biodiversity and enhance soil organic carbon. Conservation strategies address flora and fauna biodiversity by managing wildlife and livestock coexistence, with measures like wildlife corridors and rotational grazing to mitigate conflicts. Three implementation scenarios cater to private, community, and communal-private management models, emphasizing tailored grazing plans, shared resource management, and conflict mitigation strategies. The project involves collaborative efforts between Boomitra, local partners, and pastoralists, utilizing advanced technology for soil carbon measurement and monitoring while ensuring long-term sustainable outcomes for Kenya's grasslands /94/.
Implementation schedule of the project activity or activities	The project focuses on promoting sustainable grazing practices, biodiversity conservation, and community engagement. Through extensive consultations with pastoralists and supported by research, it emphasizes rotational grazing, customized grassland management plans, and pastoralist training. Data on grazing patterns and paddock use is meticulously recorded and monitored by project managers and ground staff Boomitra, in collaboration with its ground implementation partners, has initiated and continues to implement a comprehensive set of project activities aimed at improving grassland management practices throughout the crediting period. The initial field activities began on January 10, 2019, with the adoption of improved grazing practices and infrastructure development, such as paddock fencing, marking the operational start of the project. Field procedures have been developed through extensive consultations with pastoralists and grounded in the latest research to ensure locally appropriate implementation strategies. These procedures, along with standard operating procedures (SOPs), are

	made available during verification and guide the implementation of customized grassland management plans for each ranch. Project implementation includes thorough onboarding of stakeholders, technical training of ranchers, and structured data collection on key parameters such as livestock numbers and grazing duration per paddock. The project emphasizes digital record-keeping for traceability, though it is noted that sustained use of digital tools is contingent on revenue from carbon finance. Capacity-building initiatives, including regular training sessions and awareness programs, play a crucial role in fostering behavior change and ensuring long-term adoption of sustainable practices. The project demonstrates a systematic approach to Monitoring, Reporting, and Verification (MRV), with mechanisms in place to monitor and adjust practices as needed to ensure continuous improvement. Overall, the implementation plan is robust and well-structured, showing clear alignment with the project's environmental and carbon sequestration goals./89/ The project aims to harmonize coexistence among humans, livestock, and wildlife, combat environmental degradation, and establish drought-resistant grass reserves. Seasonal grazing plans, involving dry-season paddocks and wet-season open zones, are executed with community cooperation and ranger support, ensuring ecological balance, improved livelihoods, and climate resilience.
Project location	This grouped project originally encompassed grasslands across Kenya, Tanzania, and Uganda but has been revised to focus solely on Kenya to align with VCS Standard V4.5 guidelines/4/. While the initial geographic boundary included all three countries, no project activity instances have yet been initiated in Tanzania and Uganda, and baseline scenario applicability and additionality could not be demonstrated for these areas. Consequently, the project boundary was redefined to include only Kenya, where Instance 01 of the project is currently focused. The grasslands in Kenya span diverse counties, and a detailed GeoJSON of the project boundary has been prepared for validation and verification. Boomitra is actively engaging with community ranchers and pastoralists in Kenya for project implementation, emphasizing a single baseline scenario to ensure compliance with VCS requirements and enhance project efficacy /24//52/.

Conditions prior to project initiation	The baseline conditions of this project align with the pre-project scenario, with no significant negative impacts observed on the region's environmental attributes such as climate, hydrology, topography, soils, vegetation, and ecosystems/93//53/. The project takes place in Kenya's Masai Xeric Grasslands and Shrublands, part of East Africa's semi-arid to arid zones, which host rich biodiversity, including 25,000 animal species and 7,000 plant species. These ecosystems are increasingly vulnerable due to overgrazing, land degradation, and climatic challenges like rainfall variability and rising temperatures /41/. Kenya's diverse topography spans the Rift Valley, highlands, plateaus, and coastal areas, accompanied by varied soil types such as fertile volcanic soils and nutrient-poor black cotton soils. Hydrological systems include rivers, lakes, and aquifers, with the Tana River being a critical resource. However, water scarcity, pollution, and climate impacts challenge hydrology. Grasslands in the region, dominated by savanna ecosystems, are essential for supporting biodiversity and pastoral livelihoods. Historically, land use has been marked by overgrazing, high livestock densities, and minimal communal land management/25//24//20//40//41//42//51/. These practices have degraded native grasslands, causing biodiversity loss, soil erosion, and conflicts between wildlife and livestock. The project seeks to reverse these trends by introducing sustainable grazing practices, improving soil fertility, and addressing the negative effects of unsustainable land use, with Boomitra and its partners supporting the transition to communal management and responsible grazing systems.
Project compliance with applicable laws, statutes and other regulatory frameworks	The project complies with legal compliance requirements of the VCS standard v4.5 Section 3.1.4. which states. “Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not that law is enforced.” The Project has been designed and implemented to comply with the applicable national laws and regulations of the European Union. This includes the relevant laws, acts and regulations concerning relevant aspects

	of carbon emission and carbon offsetting and is clearly presented in section 1.14 of the PD/1/. Hence, it has been concluded that the project is implemented and adhere to the respective laws and regulations of the project area. Hence, it was concluded that the project is in line with the section 3.1.4 of the VCS standard v4.5 /4/. The proposed project fully complies with all relevant local, national, and international legal and regulatory frameworks, with no enforceable mandates requiring or prohibiting the project activities. In Kenya, the project aligns with key legal provisions, including Article 42 of the Constitution, ensuring the right to a clean and healthy environment, and Article 69, promoting sustainable resource management and public participation in conservation. The Climate Change Act of 2016 is supported by the project's focus on carbon sequestration, contributing to Kenya's goals of reducing greenhouse gas emissions /88/. Internationally, the project adheres to the Convention on Biological Diversity (CBD) by fostering sustainable use of grasslands and enhancing community livelihoods, while compliance with CITES ensures no harm to wildlife or biodiversity. Additionally, it aligns with conventions like the Stockholm Declaration and the International Convention on the Elimination of All Forms of Racial Discrimination, integrating sustainable development goals and equitable practices The project also supports Kenya's Nationally Determined Contributions (NDCs) under the UNFCCC, contributing to the country's goal of reducing greenhouse gas emissions by 30%–32% by 2030. This is achieved through sustainable grazing practices, agroforestry, and conservation strategies. A robust mechanism ensures precise land identification to avoid double counting of carbon credits, solidifying its compliance with regulatory and environmental standards.
Double counting and participation under other GHG programs	The Project has not sought to generate any other type of GHG carbon credits other than VCUs and has never received any other form of GHG-related environmental credit (mentioned in section 1.15.1 of PD) and has not applied for validation under any other GHG programme, nor has it been rejected for

	by any other GHG programmes, nor it has been rejected for by any other GHG programmes (mentioned in section 1.15.2 of PD). Additionally, the project is not generating emission reduction credits in a country or region with any type of compliance mechanism (mentioned in section 1.16.1) and has not sought any other type of environmental credit. The declaration of the "Boomitra Grassland restoration in East Africa through Soil Enrichment". VCS 3340 states the project is not located within a jurisdiction covered by a jurisdictional REDD+ program; has not been registered nor is seeking registration under any other GHG Program1; has not been rejected by any other GHG program; and is not part of an emission trading program or any other part of an emissions trading program or any other mechanism and has not sought or received another form of GHG related credit. No certificates have been issued under the validation body. No certificates have been issued under the validation process and a thorough process for prevention of double counting is in place in the "Boomitra Grassland Restoration in East Africa through Soil Enrichment" VCS 3340. The complete information provided by PP ensures that there is no double counting incidence in this project /96/.
No double claiming with emissions trading programs or binding emission limits	The Project has not sought to generate any other type of GHG carbon credits other than VCUs and has never received any other form of GHG-related environmental credit (mentioned in section 1.15.2 of PD) and has not applied for validation under any other GHG programmes (mentioned in section 1.15.2 of PD). Additionally, the project is not generating emission reduction credits in a country or region with any type of compliance mechanism (mentioned in section 1.16.1) and has not sought any other type of environmental credit. The declaration of the "Boomitra Grassland restoration in East Africa through Soil Enrichment" VCS 3340 states the project is not located within a jurisdiction covered by a jurisdictional REDD+ program: has not been registered nor is seeking registration under any other GHG program 1; has not been rejected by any other GHG program, and is not part of an emissions trading program or any other mechanism and has not sought or received another form of GHG related credit. No certificates have been issued under the validation process and a thorough process for prevention of double counting is in place in the "Boomitra Grassland Restoration in East Africa through Soil Enrichment" VCS 3340. The complete information provided by

	PP ensures that there is no double counting incidence in this project in this project /96/.
No double claiming with other forms of environmental credit	The supply chain emission is the condition introduced in new versions of PD and validation report. PP has mentioned in that PD section 1.16.2 that the scope 3 emission are not tracked currently. Moreover, as per the clarification to VCS program rules and requirements, effective date for the Scope 3 emission double claiming provision in Sections 3.23.7, 3.28.8, and 3.23.9 of the VCS standards, v4.5 has been delayed/4/, therefore no further assessment has been carried out in this regard /1/.
Supply chain (Scope 3) emissions double claiming	The supply chain emissions are the condition introduced in new version of PD and validation report. PP has mentioned in that PD section 1.16.2 that the scope 3 emissions are not tacked currently. Moreover, as per the clarification to VCS programs rules and requirements, effective date for the Scope 3 emission double claiming provision in Sections 3.23.7, 3.23.8, and 3.23.9 of the VCS standelayed;4.5/4/ has been delayed, therefore no further assessment has been carried out in this regard
Sustainable development contributions	In section 1.18 of the PD/1/, the PP has provided the sustainable development contributions of the project PP claims the following sustainable development contribution: - SDG 2 Zero Hunger - SDG 6 Clean Water and Sanitation - SDG 8 Decent Work and Economic growth - SDG 13 Climate action - SDG 15 Life on land Kenya has adopted a national strategy to achieve all 17 Sustainable Development Goals (SDGs) established by the United Nations in 2015, targeting social, economic, and environmental challenges for a sustainable and equitable future by 2030. Since 2015, various initiatives have been implemented, including awareness campaigns through workshops, sensitization forums, social media, and the translation of SDGs into local languages. Despite initial low awareness, assessments and targeted outreach have enhanced public understanding of SDGs across the country.

	The grouped project aligns with Kenya's SDG efforts by directly and indirectly contributing to specific goals. For **SDG 2**, it enhances sustainable food production by improving soil organic carbon (SOC), boosting fertility, and strengthening resilience to climate extremes. For **SDG 6**, it restores water-related ecosystems by improving soil structure and infiltration, reducing runoff. For **SDG 8**, it provides local employment opportunities during project implementation and monitoring. For **SDG 13**, it builds awareness and capacity for climate change mitigation through sustainable grassland practices that sequester CO2. Lastly, for **SDG 15**, it combats desertification and restores degraded land using rotational grazing, which supports vegetation recovery and reverses land degradation. This project exemplifies Kenya's commitment to achieving SDGs through actionable, community-centered environmental initiatives. Validation team finds the information in the sections 1.18 of the PD/1/ is consistent with the observation of audit team and outcome of the interviews with local communities and PP during the site Visit. PP has provided the monitoring plan for each targeted SDGs in table 5 of PD which was found complete and achievable/95/.
Additional information relevant to the project	The potential leakage management plan and implementation of leakage and manure leakage management plan and implementation of leakage and risk mitigation measures is given in section 4.3 of the PD/1/. Validation team finds the information in the sections 1.18 and 4.3 of the PD/1/ is consistent with the observation of audit team and outcome of the interviews with local communities and PP during the site visit. Further assessment of leakages is provided in the following section of this report. Commercially sensitive information in this project is the information of farmers and the financial information. This information has not been provided in the public version of PD and not presented the validation report also. The proposed grouped project adheres to strict leakage management protocols as outlined in the methodology. Each new project instance will confirm compliance with these conditions or justify the absence of leakage in its project description. For the first instance, no direct or indirect leakages

are anticipated, as the activity is entirely in-situ and does not lead to emissions or environmental impacts elsewhere. The project focuses on behavioral changes from baseline practices without introducing any new emission sources.

All information in this project description is non-confidential and accessible to stakeholders, except for commercially sensitive data such as financial audits and business forecasting models, which are integral to the company's operations. Full disclosure of internal procedures was provided to the Validator and Verification Body (VVB) for auditing, ensuring transparency and compliance.

Additionally, no other legislative, technical, economic, sectoral, social, environmental, geographic, or site-specific factors affect the eligibility of the project or its quantification of net GHG emission reductions or removals. The project framework is robust and compliant with all relevant guidelines and methodologies.

3.2 Safeguards and Stakeholder Engagement

3.2.1 Stakeholder Engagement and Consultation

3.2.1.1 Stakeholder Identification

As described in section 2.1 of the PD /1/, the project does not expect any negative environmental impacts. Boomitra Project focuses on helping the farmers/ranchers/pastoralists to shift from conventional grazing practices to rotational grazing practices. The same has been confirmed from PD and submitted evidence and reduction in application of fertiliser. The same has been confirmed from PD and submitted evidence and verified during on-site visit. The project is in conformance with VCS standard v4.5. section 3.17.16 /4/.

PD section 2.2 Local Stakeholder Consultation to include the required information of stakeholder consultation input received from client and how the inputs are considered in the project design. PP with the help of engaged partner conducted the local stakeholder engagement sessions. The Partner agreements established between PP and various entities who entered Boomitra Project have been reviewed. The purpose of these partners is to help onboarding and contracting the farmers. There are origination partners for Kenya a VVB has reviewed the signed partner agreement for Kenya added in the validation stage. These partners are responsible for farmers engagement, account creation, gathering of field data from farmers, conduct validation meetings, confirming the farmers onboarding and contracting. Once the farmers get onboarded, they help in providing actual field data to the project database and verify the values required for

input parameters for ERR calculations. They are also the first point of contact for farmers/ranchers and helps them to update the project steps and outcomes. Internally, the partners conduct meeting to discuss farmers/ranchers' status and overall progress.

Local stakeholder consultations for the grouped project have been conducted in compliance with the VCS Standard V4.5. Boomitra has established a comprehensive grievance mechanism to address concerns or potential impacts raised during project implementation. Stakeholders receive a non-technical project summary outlining project activities, benefits, and grievance mechanisms, and they are informed about risks, costs, and benefits. Consultation details, including meeting dates and locations, are publicized, and feedback is solicited through physical and electronic means. Stakeholders' consent and willingness to participate are obtained in line with Free, Prior, and Informed Consent (FPIC) procedures.

Boomitra, alongside implementation partners, 100% of the project-participating ranchers have taken part in all the surveys conducted to date, there are totally 3 participating ranches in the PAI 01 of this project and one-on-one consultations, ensuring all primary stakeholders are directly contacted. Secondary stakeholders, such as local communities, NGOs, and academics, were invited to provide input through various channels, including newspapers and emails. Local authorities, including the Designated National Authority (DNA), were also formally informed. Stakeholder engagement is ongoing, facilitated by digital platforms and regular consultations, with management plans tailored to each ranch in collaboration with experts /19//20//75//21//72//73//75/.

Initial and ongoing consultations were held virtually via Zoom to accommodate stakeholders in different locations. Registers are maintained to document stakeholder feedback throughout the project lifecycle. Stakeholder meetings and awareness programs will continue for any new instances added to the project, ensuring that all relevant stakeholders are adequately informed and engaged /19//20//75//21//72//73//75/.

The validation team based on site visit and interviews with farmers/ranchers/cattle owners/animal herders and PP concluded that there is no negative impact of project activities on the environment and the communities/95/. The validation body finds that it will provide positive environmental, social, and biodiversity benefits and hence is in accordance with section 3.16.1 of the VCS Standard v4.5 /4/.

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder identification	Local stakeholder consultations for the grouped project have been conducted in compliance with the VCS Standard V4.5/4/. Boomitra

	has established a comprehensive grievance mechanism to address concerns or potential impacts raised during project implementation. Stakeholders receive a non-technical project summary outlining project activities, benefits, and grievance mechanisms, and they are informed about risks, costs, and benefits. Consultation details, including meeting dates and locations, are publicized, and feedback is solicited through physical and electronic means. Stakeholders' consent and willingness to participate are obtained in line with Free, Prior, and Informed Consent (FPIC) procedures. Boomitra, alongside implementation partners, has engaged 100% of participating ranchers in baseline surveys, there are only 3 ranches in PAI 01 and one-on-one consultations, ensuring all primary stakeholders are directly contacted. Secondary stakeholders, such as local communities, NGOs, and academics, were invited to provide input through various channels, including newspapers and emails. Local authorities, including the Designated National Authority (DNA), were also formally informed. Stakeholder engagement is ongoing, facilitated by digital platforms and regular consultations, with management plans tailored to each ranch in collaboration with experts */19//20//75//21//72//73//75/.* Initial and ongoing consultations were held virtually via Zoom to accommodate stakeholders in different locations. Registers are maintained to document stakeholder feedback throughout the project lifecycle. Stakeholder meetings and awareness programs will continue for any new instances added to the project, ensuring that all relevant stakeholders are adequately informed and engaged.
Legal or customary tenure/access rights	The project exclusively involves lands owned by individual pastoralists and ranchers There are no impacts on external stakeholders, indigenous peoples, local communities, or areas outside the defined project boundaries.
Stakeholder diversity and changes over time	As per section 1.8 of PD which is ownership section/18/ there are no conflicts regarding land till the time of validation. There are no substantial conflicts within the communities present in the area. Each

	of the land within the project boundary is owned by the Ranch owners having similar social, economic, and cultural diversity in the region. The lands included in this project are currently free from conflicts and are owned by individual pastoralists and rancher-farmers who share similar social, economic, and cultural characteristics. There are no substantial differences within the communities involved, and no changes are anticipated in this regard throughout the project's implementation.
Expected changes in well-being	This project contributes to multiple Sustainable Development Goals (SDGs) by enhancing economic conditions through carbon finance and providing ranchers and pastoralists with access to sustainable grazing practices. Through effective capacity-building initiatives, the project promotes improved soil health and increased crop productivity, supporting long-term environmental and economic sustainability */19//20//75//21//72//73//75/*.
Location of stakeholders	This project does not involve or impact any stakeholders, Indigenous Peoples (IPs), local communities (LCs), customary rights holders, or areas outside the project boundaries. Hence, no external locations or entities are predicted to be affected by the project's implementation.
Location of resources	All lands included in this project are individually owned, with no territories, resources, or lands under stakeholder ownership or customary access involved in the project.

3.2.1.2 Stakeholder Consultation and Ongoing Communication

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder engagement process	A meeting was organized to raise awareness about the Kenya Grassland Project and its potential environmental benefits while gathering input from relevant stakeholders. The meeting details, including the date and time, were communicated through invitation letters, emails, verbal communication, and phone calls to ensure the participation of ranchers, pastoralists, and other local stakeholders,

	particularly the project's targeted beneficiaries. Additional outreach efforts included a LinkedIn post and bulk SMS messages to enhance engagement. Further details are available in Appendix 2. Boomitra has developed a comprehensive Stakeholder Engagement Plan to facilitate continuous communication and consultation with local stakeholders throughout the project's lifecycle. This proactive approach ensures stakeholder perspectives, concerns, and interests are integrated into project decision-making and management. The plan includes structured communication channels such as regular meetings, phone calls, and emails to provide updates and facilitate stakeholder inquiries. Feedback mechanisms, including anonymous logbooks and registers at Implementation Partner Organizations, allow stakeholders to share input, while regular site visits provide opportunities for direct interaction and feedback. The plan emphasizes adaptive management, with periodic reviews and updates to address evolving project dynamics and stakeholder needs. Stakeholder meetings cover grievance mechanisms, risks, and project benefits, with Boomitra and local partners explaining VCS registration, issuance, and monitoring procedures. Regular monitoring visits and training sessions for pastoralists and ranchers further ensure effective project implementation and transparency. the project sufficiently demonstrates that all stakeholder groups are represented in the stakeholder consultation. /1/
Consultation outcome	It was mentioned in Appendix 02: Local Stakeholder consultation meeting of PD/1/ where PP explained to pastoralists/ranchers, prospective partners, and other stakeholders in the Kenya region of the project that how the outcome of the projects can benefit the related stakeholders. The project spearheaded by Boomitra, in collaboration with EarthAcre and AKWCA, reflects a comprehensive approach to addressing grassland degradation through rotational grazing and sustainable land management practices. Initial studies conducted by the origination partner and intervention coordinator highlighted the necessity of transitioning from conventional grazing methods to rotational grazing, which formed the foundation of the project's design. Training manuals developed in 2018 and 2019

provided essential guidance on sustainable ranching and biodiversity conservation, ensuring the involvement of local communities and ranchers in framing and adopting these practices. The alignment between intervention coordinators' recommendations and ranchers' inputs underscores the participatory nature of the project, fostering community-driven solutions to environmental challenges /23//59//63//70/.

Capacity-building efforts have been central to the project's success. Workshops such as the "ATHI-KAPITI WILDLIFE CONSERVANCIES ASSOCIATION (AKWCA) CAPACITY BUILDING FOR RANCHERS 2018" were instrumental in equipping ranchers with the knowledge and tools needed for implementing rotational grazing. Since 2019, ranchers have demonstrated commitment by voluntarily adopting improved grazing practices, which were later formalized in consultation with stakeholders. Boomitra's scientifically rigorous implementation plan was developed in close collaboration with stakeholders, ensuring alignment with local practices and receiving unanimous consent from participating ranchers /23//59//63//70//71//72//73/.

The project's FPIC process demonstrates a strong emphasis on respecting ranchers' rights and promoting informed decision-making. Initial capacity-building sessions educated ranchers about the project's environmental and economic impacts, laying the groundwork for formal stakeholder consultations. A key milestone was the virtual stakeholder meeting held in July 2023, which brought together over 160 participants, including ranchers, researchers, government officials, and project partners. The meeting served as a platform to discuss the project design, third-party certification processes, carbon credits, and grievance mechanisms. Inputs from stakeholders were actively sought and incorporated into the project framework, ensuring transparency and inclusivity.

The virtual format of the consultation maximized accessibility, with intervention coordinators facilitating participation for those without direct digital access. Presentations by key stakeholders, including Boomitra's COO and representatives from EarthAcre and The Wildlife

	Foundation (TWF), highlighted the project's benefits, from soil health improvement to biodiversity conservation. Notably, the presentation by TWF illustrated tangible outcomes, such as increased lion populations, emphasizing the positive environmental impacts of sustainable pastoral practices. In conclusion, the project exemplifies a well-coordinated effort to integrate scientific, community-driven, and environmentally sustainable practices. The continuous engagement of stakeholders through training, consultation, and a structured feedback mechanism ensures that the project remains adaptable to local needs while promoting long-term sustainability and resilience in Kenya's grasslands.
Ongoing communication	Boomitra has established a grievance mechanism to ensure ongoing communication with local stakeholders, enabling them to express their concerns or provide feedback about the project. During stakeholder meetings, these mechanisms are explained alongside the potential risks and benefits the project may bring. With support from local implementation partners, stakeholders are informed about the project processes, including registration, documentation, issuance, and VVB site visits. Monitoring personnel regularly visit farmers to observe and record project activities, while farmers are equipped with contact details for reporting issues or seeking assistance. Regular training sessions on project activities are conducted and documented. As outlined in Section 1.15, the project adheres to all laws and regulations of Kenya, the host country.
Stakeholder input	The stakeholders have given 100% positive feedback based on stakeholder consultation. It was verified based on the Appendix 2 of PD/1/ and through site visit/95/.

3.2.1.3 Free, Prior, and Informed Consent

Item	Evidence gathering activities, evidence checked, and assessment conclusion

Obtaining consent	The project's implementation adheres to the FPIC (Free, Prior, and Informed Consent) requirements outlined in sections 3.18.7 and 3.18.8 of the VCS Standard v4.5/1/. Boomitra ensures stakeholders' rights to participate and consent during project design and implementation, incorporating their feedback and input throughout the consultation process. All participating ranchers have consented to the project activities, supported by legal agreements that irrevocably assign rights to Greenhouse Gas Reductions and Removals generated on their lands to Boomitra, with clear disclaimers on any rights to Carbon Credits. These agreements comply with section 3.7.1 of the VCS Standard v4.5 and have been fully explained to ranchers, using local languages to ensure understanding. The project operates on privately owned ranchlands in Kenya, excluding indigenous or tribal community lands, thus eliminating the immediate need for FPIC concerning community land rights. However, for future instances involving community lands, FPIC processes will be strictly followed, including consent from the Community Land Management Committee and signed agreements by elected community leaders. Participating ranchers retain their property rights, and all agreements were executed after comprehensive explanations of project details, scope, risks, and benefits. Additionally, Boomitra has addressed concerns about double-counting by verifying that ranch polygons are not enrolled in other carbon projects, ensuring compliance and transparency.
Outcome of FPIC discussion	Ranchers participating in the project have been thoroughly informed about its benefits and the processes involved, as outlined under the VCS standard. To ensure comprehensive understanding, agreements were provided to the ranchers in the local language, enabling them to make informed decisions. The consultation process confirmed that all land included in the project are free from encroachment and that none of the project activities involve the relocation of people or communities. This reflects the project’s commitment to transparency,

Mechanism	Methods Chosen (include all known details e.g., location of book, phone, number, identity of mediator)	Justification of choice (best of choices)
Continuous Input / Grievance Expression Process Book	Physical register has been maintained at each implementation partner head office.	Farmers who do not have access to internet or phone can come directly to the office and register their grievance.
Telephone access	+254757039368	Farmers can call this number to register their grievance
Internet/email access	Info@boomitra.com Farmers who do not have access to internet or phone can come directly to the office and register their grievance.	Farmers who have an internet connection can contact through this method.
	respect for land ownership, and adherence to ethical implementation practices.	

3.2.1.4 Grievance Redress Procedure

Boomitra has established a robust, multi-level grievance redressal mechanism to handle any grievances arising during the project cycle, meeting key global standard requirements. This mechanism has been discussed during stakeholder consultations and is accessible to all relevant stakeholders within the project area. The grievance process enables project participants implementing AFOLU activities to make synchronized and effective decisions while aligning with national policies and internationally agreed objectives. Boomitra also emphasizes the need for dedicated professional staff at different levels to ensure proper support and guidance throughout the project.

The grievance redressal mechanism includes multiple accessible channels: physical registers maintained at regional and partner offices for in-person complaints, a dedicated phone line, and an email address for stakeholders with internet access. These options ensure inclusivity for all participants, regardless of their access to technology. Additionally, a mutually accepted Safeguard and Safeguard Information System will be implemented to mitigate environmental and social risks and to enhance benefits beyond carbon emission reductions. By integrating these mechanisms, Boomitra reinforces its commitment to transparency, stakeholder engagement, and adherence to international best practices.

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Development process	Physical register has been maintained at each implementation partner head office.
Grievance redress procedure	Farmers can call this number to register their grievance +254757039368 and contact on email id Info@boomitra.com

3.2.1.5 Public Comments

In accordance with the requirement in para 3.17.6 of the VCS standard v4.5 “All projects are subject to a 30-day public comment period. The date on which the project is listed on the project pipeline marks the beginning of the project’s 30-day public comment period”.

This project was open for public comment for 30 days from 02/08/2022 to 01/09/2022 for public comments. Comment received during the commenting period, as evident from the VCS pipeline in the web interface was addressed by PP in the audit finding rounds.

CL#24 and CL#25 are closed and FAR#02 is initiated for public Comment.

Comments received	Actions taken by the project proponent	Evidence gathering activities, evidence checked, and assessment conclusion
Organization: Laikipia Conservancies Association (LCA) Comment: This morning, I was alerted to the listing of Project no 3340 (BOOMITRA	The organizations' consent is being discussed now. Conversations with organizations are now taking place both	It has been verified through email communication channel that discussion is going on regarding the comments /31//32/.

GRASSLAND RESTORATION IN EAST AFRICA THROUGH SOIL ENRICHMENT) on the Verra registry. Looking at the submitted KML file, the intended project includes Laikipia Country, which therefore includes all LCA member landscapes. Although we have had a few introductory conversations with the proponent parties, EarthAcre and Boomitra, at no point has the LCA nor its constituent members consented to this project or entered into any agreements that would suggest otherwise.	verbally and over email. This procedure is ongoing, and updates will be provided after it is completed. Ranchers/pastoralists ' consent will be sought, and formal agreements will be signed if they desire to participate in the project. Boomitra will present the agreements as evidence of pastoralist consent.	
Organization: Maasai Mara Wildlife Conservancies Association (MMWCA) **Comment**: The Maasai Mara Wildlife Conservancies Association (MMWCA) is a membership organisation of the Mara conservancies, with a current membership of 22 Conservancies whose land is part of or integral to the Greater Maasai Mara ecosystem. Additionally, we are a member of the Kenya Wildlife Conservancies Association,	....	

contributing to the growth and development of conservancies nationally. Our Conservancies are based on a partnership between the Landowners and Tourism Partners, with MMWCA playing the coordination role. In this regard, we, among other things, work to create a common and unified front for landowners, communities and tourist partners to strengthen conservancies and create a large-scale impact in the greater Mara Ecosystem. We note that Boomitra seeks to implement a general, high-level grasslands restoration project in Southern Kenya, including Narok County. We wish to inform Verra that MMWCA, its member conservancies and relevant stakeholders in the Greater Mara Ecosystem are collaborating to implement sustainable grasslands management in the landscape. In this regard, we will seek carbon finance to support climate change mitigation goals under the "One Mara Carbon Project". As we prepare to seek the VCS listing, we note that our identified project area		

falls within the boundaries of the Boomitra project. Therefore, given that we have secured conservancies stakeholders' support in our area for our vision, we wonder if the Boomitra project may interfere with our ability to establish a successful, separate project for our land in the future.		

3.2.2 Respect for Human Rights and Equity

3.2.2.1 Labor and Work

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Discrimination and sexual harassment	It has been verified that Boomitra and its implementation partners do not involve in any form of discrimination or sexual harassment. Boomitra Inc follows international standards and abides of project. They follow an inclusive working environment free of discrimination at all stages of the employment life cycle, and it also promote and create plans to allow different cultures to strive by a providing conducive environment to flourish. They have ethical policy they follow. / 52/
Management experience	Boomitra Inc regarding the project "Boomitra Grassland Restoration in East Africa through Soil enrichment" involves several different aspects of the project execution, which is central to overall management and governance of the project. The team comprises people with 10+ years of experience who have been successful in getting dozens of carbon projects 3rd party validated and verified, with a variety of international standards from CDM to Gold Standard. The farmer engagement team ensures that all the queries are answered thoroughly and makes sure efficient recruitment of farmers. More information about Boomitra is available at https://boomitra.com/

Gender equity in labor and work	Based on ESPL audit the initiative has no detrimental influence on gender equality or the position of women or anyone involved in the project, either directly or indirectly. The project takes no account of gender roles or the capacities of men and women. Everyone is treated fairly and given equal opportunity.
Human trafficking, forced labor, and child labor	This project does not involve or compel local communities to work as forced labor. Forced labor is unlawful in the host country, and local labor compliance takes this into account.

3.2.2.2 Human Rights

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Human rights	Even though Kenya has not ratified ILO Convention 169, Boomitra Inc acknowledges, respects, and promotes the rights of IPs, LCs, and customary rights holders in accordance with applicable international human rights law and the United Nations Declaration on the Rights of Indigenous Peoples.

3.2.2.3 Indigenous Peoples and Cultural Heritage

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Preservation and protection of cultural heritage	Based on our observation this project does not involve any locations, structures, or objects with historical, cultural, artistic, traditional, or religious qualities, or intangible forms of culture; also, the project does not necessitate or result in the physical or economic migration of people. All project activities take place on lands held by the communities in the region, over which they have appropriate land rights.

3.2.2.4 Property Rights

Item	Evidence gathering activities, evidence checked, and assessment conclusion

Rights to territories and resources	The project activities are conducted exclusively on lands owned by private landowners and communities in the region, with all parties holding proper and verified land rights. As such, no external land areas or stakeholders are impacted, and the project operates within the boundaries of legally owned and managed lands. This ensures compliance with land ownership and usage regulations, and no additional considerations are applicable in this context
Respect for property rights	There is no anticipated risk to stakeholder resources from the project, as all property rights are fully recognized, respected, and supported. The lands proposed for the project's first instance are privately owned, with clear property titles issued by the competent national authority and are free from any litigation. As outlined in Section 1.8, ranchers and pastoralists enrolling their lands irrevocably assign the rights, title, and interest to the Greenhouse Gas Reductions and Removals generated on their lands to Boomitra through Intervention Coordinators. Participants disclaim all rights to any Carbon Credits arising from their lands, as formalized through enforceable and irrevocable legal agreements in accordance with Section 3.7.1, point 6 of the VCS Standard v4.5

3.2.2.5 Benefit Sharing

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Process used to design the benefit sharing plan	Boomitra, in collaboration with its implementation partners, has engaged with all participating ranchers, providing clear explanations of the project details and the terms and conditions related to carbon credits in the ranchers' native languages. Following these consultations, the ranchers have signed carbon credit agreements with Boomitra. For complete details on benefit sharing, please refer to the Ownership section of this document. The carbon rights agreements with the farmers have been shared with the VVB during the audit

Summary of the benefit sharing plan	It was verified through site visit and through section 1.8 of PD that Individuals or entities enrolling their lands irreversibly grant to Boomitra the right, title, and interest in the Greenhouse Gas Reductions and Removals created on their lands because of the project. Individuals or companies enrolling their lands waive all rights, title, and interest in any Carbon Credits generated by the land. Legal agreements with the individuals and/or companies enrolling their lands cover this. Each participating rancher has been given information on the carbon revenue sharing program. The agreement is available in both English and Swahili, and the field staff carefully explains each item to guarantee the ranchers' full informed approval. Before enrolling in the project, Boomitra, with the assistance of local implementation partners, conducted thorough and in-depth discussions with the ranchers to explain the carbon revenue benefit-sharing process. These discussions ensured that the carbon revenue sharing agreement was developed in consultation with the ranchers, and it includes clear terms regarding the distribution of revenue. The agreement, which outlines the revenue-sharing mechanisms, was explained to the ranchers in their native language. Ranchers who expressed interest in participating in the program were then enrolled through a proper and transparent enrollment process.
Approval and dissemination of benefit sharing plan	The carbon agreements contain comprehensive details of the benefit-sharing plan, outlining the terms and conditions for carbon credit revenue distribution among the participating ranchers. These agreements have been shared with the Validation and Verification Body (VVB) as part of the audit process, ensuring transparency and compliance with the required standards.

3.2.3 Risks to Local Stakeholders and the Environment

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Risks to stakeholder participation	There are no identified risks associated with the participation of stakeholders in the project. All stakeholders are treated equally and are thoroughly informed about the project's objectives and activities. The project

	does not have any negative impact on the livelihoods of the communities involved. VVB reviewed Table 8: Risk Assessment and Safeguarding Principles of PD/1/ for detailed explanation.VVB Also confirmed it through the site visit and interviews with the stakeholder */93//19//20//75//21//72//73//75/.*
Working conditions	Through site visit/95/ and desk review VVB observed that during the implementation and monitoring phases of the project, local populations are given equal opportunity. The project generates employment opportunities for local communities during both the implementation and monitoring phases, ensuring equal opportunities for all. A comprehensive HR policy has been established to guarantee safe working conditions for all employees. Additionally, field staff and representatives from partner organizations are provided with a secure and safe work environment, promoting a positive and supportive work culture throughout the project.
Safety of women and girls	In the project "Boomitra Grassland Restoration in East Africa through Soil Enrichment", equal opportunity to is given to both women and vulnerable communities to participate under this project. The project actively encourages the participation of women and vulnerable communities, ensuring equal opportunities for all. A comprehensive HR policy has been implemented to maintain safe working conditions for women employees, promoting inclusivity and equality in the workplace. Observations indicate that many representatives from partner organizations are women from the local community. After consulting with these representatives, no risks have been identified concerning the working conditions or social dynamics in the region, ensuring a safe and supportive environment for all participants.
Safety of minority and marginalized groups, including children	No risk foreseen/observed in this project regarding safety of minority and marginalized groups, including children. VVB also confirmed it through the site visit and interviews /93/.
Pollutants (air, noise, discharges to water,	The project does not involve any activities that would release pollutants hazardous to the environment, and therefore, no environmental risks are anticipated, the assessment team confirmed it through review of section

generation of waste, release of hazardous materials)	1.12 Of PD/. The core activity of the project focuses on promoting sustainable grazing practices among pastoralists, which do not generate co-pollutants or hazardous materials. Sustainable grassland management improves soil health by increasing organic matter and enhancing soil structure, which aids water infiltration and reduces runoff. Rotational grazing allows plants to regenerate, contributing to grassland restoration and potentially reversing desertification. These practices also help prevent land conversion to croplands, supporting the livelihoods of pastoralists while protecting biodiversity by maintaining vital habitats for local flora and fauna. The project does not involve lands that are culturally or ecologically sensitive, and all participating ranchers have signed clear agreements with Boomitra that outline the project's rules and guidelines. Since the project does not have a negative environmental impact, it does not require an Environmental Impact Assessment (EIA) under Kenya's Environment Management and Coordination Act (EMCA, 1999).

3.2.4 Ecosystem Health

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Impacts on biodiversity and ecosystems	The project poses minimal risks to biodiversity and ecosystems, as no non-native plant species are introduced, and no invasive species are introduced through project activities. The primary focus of the project is on improved grassland management, particularly through rotational grazing practices, which help to enhance local biodiversity. Rotational grazing promotes a diverse native plant community, which can reduce the growth of invasive species by preventing environmental disturbances that typically support them. The project also includes strategies to improve habitat connectivity and regularly monitors biodiversity. Since the project revolves around agricultural activities involving farmers, it does not negatively impact local ecosystems. Overall, the risk to biodiversity is considered low, with the project's activities supporting the regeneration and preservation of native species.
Soil degradation and soil erosion	It has been verified through site visit and from desk review of section 1.12 of PD that all the activities involved in this project will help in improving soil health and increase SOC levels. The project does not pose a significant risk

	of soil degradation or soil erosion. The focus on sustainable grazing and livestock management practice effectively mitigates risks such as soil compaction and the loss of soil structure. Rather than exacerbating soil issues, the project promotes activities that improve soil health and increase soil organic carbon (SOC) levels, enhancing soil fertility and resilience. These practices help prevent soil erosion and degradation, ensuring that the land remains productive and environmentally sustainable. Overall, the risk of soil degradation is considered low, with the project activities contributing to the restoration and enhancement of soil quality
Water consumption and stress	It has been verified that one of the activities promoted in this project is water management. This activity will reduce the over consumption of the water thereby reducing the stress on water availability in the project area. The project effectively addresses water consumption and stress in the region, with no significant risks identified regarding water availability. The risk category is considered low, as the project incorporates water conservation and management practices such as Keylines, Gabions, micro basins, and ponds. These measures, coupled with training on sustainable water use, ensure that water resources are managed efficiently and conserved over time. By promoting proper water management techniques, the project aims to reduce water stress in the region, mitigate the impacts of erratic rainfall and climate change, and enhance water security. These efforts will help ensure sustainable water availability in the project area, contributing to the long-term resilience of the local ecosystem and communities.
Usage of fertilizers	The project effectively mitigates risks associated with fertilizer use, with no significant risks identified. The risk category is classified as low, as none of the participating ranchers or pastoralists in the project use synthetic fertilizers. The project focuses on educating ranchers about the benefits of natural soil regeneration through practices that minimize soil disturbance, thereby preserving soil structure and health. By promoting sustainable and regenerative grazing management practices, the project encourages reduced and optimized fertilizer application. This approach not only prevents potential issues such as nutrient runoff, eutrophication, and disruptions to microbial soil communities but also fosters a more self-sustaining ecosystem. The project's emphasis on soil health and sustainable practices contributes to long-term environmental resilience.

3.2.4.1 Rare, Threatened, and Endangered species

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Species and habitat	The project has identified and accounted for the presence of several rare, threatened, and endangered species within or adjacent to the project area, including species such as the Lesser Kudu, Oryx, Plains Zebra, Giraffe, and several vultures, wild cats, and birds of prey which was confirmed through the assessment desk review and site visit /93/. However, the project does not foresee any net negative environmental impacts, as its activities are designed to improve soil fertility, which in turn enhances forage yields and reduces wildlife-livestock conflicts. The project promotes integrated wildlife and livestock grazing systems, which have already proven beneficial to local communities by reducing such conflicts. A comprehensive mitigation plan is in place, focusing on sustainable grazing practices, establishment of wildlife corridors, and habitat protection measures such as buffer zones around sensitive areas. The plan also includes minimizing construction disturbances, scheduling activities to avoid critical wildlife times, and using paddock fencing to separate livestock grazing areas from wildlife movement zones. Furthermore, the project encourages community-based conservation efforts and promotes awareness to reduce human-wildlife conflicts. Monitoring and adaptive management strategies will ensure ongoing assessment and adjustment to the project's impact, fostering long-term biodiversity conservation.

3.2.4.2 Introduction of Species

Species introduced	Evidence gathering activities, evidence checked, and assessment conclusion
It has been verified through site visits and interviews /5/ PD section 2.4.2 and through site visit that none of the project activities promote introduction of new/invasive species.	

Existing invasive species	Evidence gathering activities, evidence checked, and assessment conclusion
Not Applicable	Not Applicable

3.2.4.3 Ecosystem conversion

Item	Evidence gathering activities and evidence checked
Ecosystem conversion	It has been verified through desk review audit of PD through section 2.4.3 and through site visit that there is no ecosystem conversion observed for the last 10 years. The project underwent a thorough analysis of land use and land cover (LULC) variations among participating farmers, using MODIS/Terra Land Cover Types and the GLAD Global Land Cover dataset. Despite some challenges related to spatial resolution and missing satellite data, the analysis confirmed that all participating ranches have remained grasslands, with no clearing of native ecosystems occurring in the last decade/. In addition, land records and usage history were reviewed to further validate these findings. The project has followed a comprehensive stakeholder consultation process, engaging ranchers and community members in discussions about sustainable grazing practices and carbon revenue sharing. All stakeholders, including ranchers, have provided their free, informed, and fair consent to participate in the project, in line with the VCS Standard. The project does not involve vulnerable groups, forest carbon, or land use changes and complies with land tenure and resource rights for private ranches. The project's environmental impacts are positive, as it promotes the sustainable management of grasslands, enhances soil fertility, and fosters biodiversity through practices like rotational grazing. The risk of reversals, such as ranchers returning to traditional grazing practices or converting land to farming, is mitigated through education and strong community engagement. The project also adheres to local and national legal requirements, maintains transparency, and implements effective monitoring and grievance mechanisms to address stakeholder concerns throughout the project cycle.

3.3 Application of Methodology

3.3.1 Title and Reference

The details of the methodology and tools applied for the grouped project are given below:

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	VM0042	Improved Agricultural Land Management	V1.0, dated 19th October 2020
Module	VMD0053	Model calibration, validation, and uncertainty guidance for the methodology for improved agricultural land management[2]	Dated 19th October 2020, version 01
Tool	AFOLU Non-Permanence Risk tool	Non-Permanence Risk Tool	V4.0 dated, 19th September 2019

Table 1: Details of the methodology and tools applied.

3.3.2 Applicability

The validation team has checked the applicability condition of applied methodology and tools for the grouped projects and first PAI and the same has been justified as follows:

Methodology ID	Applicability condition	Assessment and conclusion
VM0042	Projects must introduce or implement one or more new changes to pre-existing agricultural management practices which includes, Improve grazing practices.	The project introduces new sustainable grassland management practices that were not previously implemented

[2] MODEL CALIBRATION, VALIDATION, and UNCERTAINTY GUIDANCE for the METHODOLOGY for IMPROVED AGRICULTURAL LAND MANAGEMENT Sectoral Scope 14 VMD0053, Version 1.0 Sectoral Scope 14 2 CONTENTS. 2020, verra.org/wp-content/uploads/imported/methodologies/VMD0053_Mo.Accessed on 6 Aug

	A change constitutes the adoption of a new practice (e.g., adoption of one of the illustrative improved grassland management practices listed in Appendix 1), the cessation of a pre-existing practice (e.g., stop over grazing or continuous grazing), or an adjustment to a pre-existing practice that is expected to reduce GHG emissions and/or increase GHG removals. Any quantitative adjustment (e.g., decrease in fertilizer application rate) must exceed 5% of the pre-existing value.	under the baseline scenario, which involved continuous unsustainable grazing on both community-owned and privately-owned grasslands. These improvements are aimed at enhancing the sustainability of grazing practices without the use of fertilizers. Both the baseline and project scenarios do not involve the application of fertilizers, meaning that there is no adjustment to agri-inputs in the project, and any potential increase does not exceed 5%. Therefore, this project does not qualify as a practice requiring quantitative adjustments for agri-inputs, as no fertilizers are being used in either scenario. The project focuses solely on promoting sustainable grazing practices, which contributes to better land management without altering the use of fertilizers.
VM0042	Project activities must be implemented on land that is either cropland or grassland at the project start date and remains cropland or grassland throughout the project crediting period.	The project is implemented on grassland (rancher field), and this has been verified through KML files of project zones and geodetic coordinates. The Validation team checked the area and geodetic coordinated through google earth /51/. Global map of land use/land cover (LULC) derived from ESA Sentinel-2 imagery at 10m resolution was used to confirm the same. Hence, the project meets the applicability criteria /24//95//93/.

VM0042	The project area must not have been cleared of native ecosystems within the 10-year period prior to the project start date.	The project is implemented on Grassland (farmers/ranchers' field), and this has been verified through KML files /93/ of project zones and geodetic coordinates. The validation team checked the area and geodetic coordinated through google earth /51/. Global map of land use/land cover (LULC) 2022 derived from ESA Sentinel-2 imagery at 10m resolution was used to confirm the same. Hence, the project meets the applicability criteria /24//95//93/.
VM0042	The project activity is not expected to result in a sustained reduction of greater than 5% in productivity, as demonstrated by peer-reviewed and/or published studies on the activity in the region or a comparable region.	The project meets the criteria as the project activity helps to increase the productivity and soil organic carbon stock. Relevant published literature/18//24/ also confirmed that the introduced practices are helpful in enhancing the productivity of the soil. /94//93/ It has been demonstrated in section 4.3 of this PD.
VM0042	If the project activity involves the application of biochar, it must be produced using feedstock that would otherwise have been left to decay in aerobic or anaerobic conditions or been burned in an uncontrolled manner. Eligible feedstocks include one or more of the following categories of biomass: • Crop residues, • Material from pruning or thinning of woody vegetation (not including merchantable	Not applicable as the project does not include application of biochar

	timber) in agricultural systems such as shade trees, orchards, windbreaks, stream buffers, silvopasture, or invasive removal on rangeland, • Off-cuts, sawdust, and other material produced as a by-product of forest management or harvesting operations, • Diseased trees or deadwood felled during plantation or woodland management; and/or • Residential, commercial, or industrial organic food or yard waste. There may not be any other carbon incentive awarded to produce biochar applied on the project area. The project activity cannot include application of biochar as a soil amendment.	
VM0042	The project activity cannot occur on a wetland. Note that this condition does not exclude crops subject to artificial flooding where it can be demonstrated that crop cultivation does not impact the hydrology of any nearby wetlands	The project is implemented on grassland, and this has been verified through KML files of project zones and geodetic coordinates. Global map of land use/land cover (LULC) derived from ESA Sentinel-2 imagery at 10m resolution was used to confirm the same. Hence, the project meets the applicability criteria/24//93/.
VM0042	Additional conditions where models are applied: The methodology does not mandate the use of any specific model. Rather, this methodology is applicable where empirical or process-based models used to estimate stock change/emissions.	The project utilizes the process-based RothC model to simulate changes in carbon stocks, which is an established method for estimating soil carbon dynamics. As the RothC model is used specifically for simulating carbon stock changes rather than direct emissions estimation, the applicability conditions typically required for emissions estimation models do not apply in this case. Further details regarding the use

		of the RothC model within the project are provided in Section 5.3 of the Project Design document (PD), which outlines how the model is integrated into the project's carbon accounting methodology. The project utilizes the RothC model to estimate soil carbon stock changes and emissions in the baseline and project scenarios, ensuring a consistent, scientifically validated approach to carbon accounting. The RothC model is publicly available and extensively documented, with peer-reviewed studies supporting its ability to accurately simulate organic carbon changes soil and trace gas emissions resulting from various agricultural management practices, including rotational and continuous grazing. This model has been successfully applied globally, including in grassland systems similar to those in this project, and has been calibrated using peer-reviewed data specific to the project's climate zones and soil types. The RothC model used in this project adheres to the requirements outlined in the VMD0053 guidelines for model calibration and validation. It operates with a clear versioning system and stable software support, ensuring reproducibility of simulations. The model's

		predictions are regularly validated and prediction errors quantified, ensuring accuracy in estimating carbon dynamics. Model input data follows the prescribed procedures, and uncertainty is carefully quantified. The same version of the model and parameters are used for both the baseline and project scenarios to maintain consistency across the project lifecycle. Overall, the RothC model provides a reliable and scientifically sound tool for assessing carbon stock changes in grassland management projects. Its use in this project is aligned with the best practices outlined in the relevant guidance documents, ensuring that carbon sequestration estimates are robust and credible /85//86//87/.

3.3.3 Project Boundary

Project operations are taking conducted throughout the project area and have the greatest impact on soil carbon. All other stock or pool changes are considered negligible in comparison to total net anthropogenic GHG reductions and removals. According to the VCS rules, minor emission sources are prohibited.

All other GHG sources (CH4 and N2O) have been omitted from the project boundary because none of the project activities include them. According to the methodology (part 5), /8/.

If the increase in greenhouse gas emissions from any project emissions or leakage source, and/or decreases in carbon stocks in carbon pools, is less than 5% of the total net anthropogenic GHG emission reductions and removals due to the project, such sources and pools may be

considered de minimis and ignored (i.e., their value may be accounted for as zero). The instrument (CDM A/R methodological instrument) provided in VM0042 methodology will be used to assess this during the verification step.

There is no statistically significant leakage because livestock numbers are not changing (decreasing) in a statistically significant way, at least as measured by continuous pastoralist-attested livestock counts, which will be presented in the monitoring report for the initial crediting period. Furthermore, the methodology specifically states that decreases in animal emissions owing to a drop in livestock numbers must not be credited. As a result, livestock-related enteric emission variations are excluded because they are also regarded de minimis

	Source	Gas	Included?	Justification/Explanation
Baseline	Soil Organic Carbon	CO_2	Yes	Primary stock changing due to improved grassland management activities
		CH_4	No	As per the methodology (section 5), excluding these gases. Please refer the paragraph below the table for more explanation.
		N_2O	No	
		Other	No	
	Fossil Fuel	CO_2	No	As per methodology (section 5), where the increase in greenhouse gas emissions from any project emissions or leakage source, and/or decreases in carbon stocks in carbon pools, is less than five percent of the total net anthropogenic GHG emission reductions and removals due to the project, such sources and pools may be deemed de minimis and may be ignored (i.e., their value may be accounted as zero).
	Soil Methanogenesis	CH_4	No	
	Enteric Fermentation	CH_4	No	
	Manure Deposition	CH_4	No	
		N_2O	No	
	Use of Nitrogen Fertilizers	N_2O	No	
	Use of Nitrogen Fixing species	N_2O	No	
	Biomass burning	CO_2	No	
	Biomass burning	CH_4	No	
		N_2O	No	

	Source	Gas	Included?	Justification/Explanation
	Woody biomass	N_2O	No	
Project	Soil Organic Carbon	CO_2	Yes	Primary stock changing due to improved grassland management activities
		CH_4	No	As per the methodology (section 5), excluding these gases. Please refer the paragraph below the table for more explanation.
		N_2O	No	
		Other	No	
	Fossil Fuel	CO_2	No	As per methodology (section 5), Where the increase in greenhouse gas emissions from any project emissions or leakage source, and/or decreases in carbon stocks in carbon pools, is less than five percent of the total net anthropogenic GHG emission reductions and removals due to the project, such sources and pools may be deemed de minimis and may be ignored (i.e., their value may be accounted as zero).
	Soil Methanogenesis	CH_4	No	
	Enteric Fermentation	CH_4	No	
	Manure Deposition	CH_4	No	
	Use of Nitrogen Fertilizers	N_2O	No	
	Use of Nitrogen Fixing species	N_2O	No	
	Biomass burning	CO_2	No	
	Biomass burning	CH_4	No	
		N_2O	No	
	Woody biomass	CO_2	No	

Boundaries in Space

The project area is defined by the grasslands located in the locations indicated in section 1.13 of the PDD/1/. Individual project areas' geo-fenced borders will be clearly delineated according to Section 5 of the methodology and will be available at any time when additional areas are added. Individual grassland regions' digital files will be submitted in Keyhole Markup Language (KML) file format, as required by the VCS Standard v4.5/4/.

The project primarily focuses on sequestering Soil Organic Carbon (SOC) through the implementation of sustainable grassland management practices, which significantly outweigh

the emissions from other greenhouse gas (GHG) sources such as enteric fermentation and manure deposition. The project's activities have been assessed using the CDM AR Methodological Tool to demonstrate that GHG sources other than SOC are negligible within the project boundary, as these emissions contribute less than 0.09% to the overall GHG emissions. The SOC sequestration potential of the project is substantial, with an estimated 93,371 tons of SOC to be sequestered across 9,033 hectares, which represents around 99% of the total GHG reductions achieved by the project /67/.

Emissions from enteric fermentation and manure deposition, while present, are deemed insignificant in comparison to the carbon sequestration achieved by the improved grazing practices. The project's sustainable grazing methods, such as controlled grazing and rotational paddock use, mitigate these emissions by improving forage quality, enhancing digestion, and promoting more even manure distribution, thus reducing methane (CH4) and nitrous oxide (N2O) emissions. Additionally, the livestock population has not shown any significant changes during the baseline and project scenarios, further supporting the conclusion that these emission sources are minimal /67/.

The exclusion of these minor emissions from the project boundary aligns with the guidelines in the VCS methodology, which allows for the exclusion of GHG sources contributing less than 5% of the total net anthropogenic GHG reductions. The project's focus on SOC sequestration, alongside the minor impact of livestock-related emissions, illustrates the project's effectiveness in addressing climate change through sustainable land management practices. The project's spatial boundaries, covering 9,033 hectares initially with plans to expand to over 11,291 hectares, have been clearly demarcated and will be verified during the monitoring stage. The demonstration of insignificant emissions using the CDM AR tool further supports the credibility of the project's carbon reduction claims /67/.

3.3.4 Baseline Scenario

The baseline scenario has been given in section 3.4 of the PD/1/. As per the applied methodology VM0042, the quantification approach used to determine the values of the parameters are quantification approach 1: measure and model for soil organic carbon and soil methanogenesis, and quantification approach 3; default for the parameters applied in this project which required to be quantified using approach 3. The baseline scenario assessment has been done in line with the VM0042 requirements given in section 6/8/.

VVB assessment highlights unsustainable grazing practices as the baseline scenario for this project, which significantly contributes to grassland degradation in Kenya. Without intervention,

the region would continue to face overgrazing, human-wildlife conflicts, and a decline in ecosystem health. -The baseline scenario is characterized by inevitable grassland degradation driven by continuous overgrazing due to unstructured grazing management, land-use conflicts, and increasing pressure on limited pasture resources. Across both private and communal lands, livestock graze without rotation or paddocks, preventing vegetation recovery and exacerbating competition between livestock, wildlife (e.g., wildebeest), and predators (e.g., lions), leading to ecological imbalance and human-wildlife conflict.

The absence of training, community involvement, and structured land management further accelerates degradation. A shift from nomadic to sedentary lifestyles, influenced by land policy changes and subdivision, has led to unsustainable individual grazing practices. Conservancies exist but lack proper grazing plans, allowing overgrazing to persist.

Colonial-era policies, population pressures, and the erosion of pastoral culture have worsened the situation. Without intervention, pastoralists may continue unsustainable practices, convert land to cropland, or sell it off, all contributing to further ecosystem decline.

Land in the project area is primarily privately owned and used for grazing with commercial elements, not just for local consumption. The project introduces carbon finance as a secondary income stream, offering economic incentives for sustainable land management and improved livelihoods.

Historical factors such as land policies, population growth, economic pressures, and the disruption of traditional pastoral practices have compounded these issues. Without the project's intervention, pastoralists may continue unsustainable grazing practices, shift to agriculture, or sell off land, accelerating grassland and ecosystem degradation.

VVB assessment was conducted as per VM0042 methodology Table 4/8/ and evaluated the baseline conditions through surveys and interviews done by the Project proponent with ranchers and pastoralists across the project area /95/. The baseline survey gathered quantitative and qualitative data from 2016 to 2018 (t=-3) to determine pre-project agricultural practices, focusing on grazing methods, livestock stocking rates, and grassland management activities. All data were collected through in-person interviews, followed by telephonic reassurances, and verified with signed attestations from landowners/18//66/. The assessment team confirmed this during the on-site visit and interviews with the landowners/18//66/.

The survey revealed continuous, unplanned grazing and overstocking as the dominant baseline practices, leading to grassland degradation, reduced soil health, biodiversity loss, and frequent human-wildlife conflicts. Livestock types included cattle, sheep, goats, and horses, with stocking

rates varying across ranches. Wildlife grazing was also observed, with animals such as cheetahs, wildebeests, zebras, and hyenas contributing to resource competition and predation. The absence of rotational grazing, paddock management, and training exacerbated the degradation/97//61//62/. Additionally, no synthetic fertilizers, irrigation, controlled burning, or crop cultivation were practiced in the baseline scenario, aligning with regional norms for rangelands which was also confirmed through the on-site visit and interviews with the farmers /93/.

Historical data revealed that all surveyed ranches had remained grasslands for at least 15 years, receiving an average annual rainfall of 35 inches. Grassland degradation over the past two decades was driven by population growth, land-use changes, and unsustainable practices, including unmanaged grazing and land subdivision. Observations of the three project ranches—Lisa Ranch, Lukenya Ranch, and Machakos Ranch—identified overstocking and continuous grazing as prevalent practices. These findings underscore the need for sustainable grazing practices to address degradation and improve ecosystem health /61//62//63/.

The project ensures that baseline assessments are consistent across current and future instances. Each new activity instance will align with the initial baseline scenarios and geographic boundaries, using geodetic polygons for precise mapping. Baselines will be updated every 10 years in accordance with VM0042 version 1.0 methodology to reflect changing environmental and socio-economic factors, ensuring long-term project relevance and effectiveness /24//93/.

3.3.5 Additionality

The proposed project is a voluntary initiative undertaken by Boomitra and is not mandated by any existing legal, statutory, or regulatory framework in Kenya, particularly in the context of grassland and rangeland management. No legal or policy mandates enforce the prescribed improved grazing practices, such as rotational grazing, which are central to this project. Several reports, including the Kenya Rangeland Study by the ELD Initiative and the Participatory Rangeland Management Toolkit, emphasize the lack of robust governance structures and the inadequacy of existing laws to enforce sustainable grazing practices. While Kenya's legal framework, including acts like the Wildlife Conservation and Management Act and the Agriculture Act, encourages sustainable land management practices, they do not mandate rotational grazing or sustainable livestock management. Consequently, the VM0042 methodology's regulatory surplus requirements are satisfied, as these practices exceed legal obligations and are voluntarily undertaken by the communities involved /8/.

In addition to the absence of regulatory mandates, the project also identifies several significant barriers preventing the adoption of improved agricultural land management (ALM) practices, including rotational grazing. These barriers include cultural and social resistance, lack of access to knowledge and information, financial constraints, and climatic vulnerability. Many pastoralist communities in Kenya face poverty and climate-dependent livelihoods that make it difficult to prioritize sustainable practices. Further complicating the situation, there are substantial financial barriers, as most pastoralists cannot afford the initial investments required to implement rotational grazing at scale. Additionally, there is a lack of institutional support and financial infrastructure, which further limits access to the resources needed to implement sustainable land and water management practices /63//64//34//35/.

The project also demonstrates that the proposed activities are not common practice in the region. For example, the adoption of rotational grazing is estimated to be around 10%, and other activities such as biodiversity conservation and water management have similarly low adoption rates. Without the additional incentive provided by carbon credit, these practices would likely remain unimplemented. The expert opinion provided indicates that less than 20% of the proposed activities are common in the region, fulfilling the threshold required by the VM0042 methodology for additionality. The project thus meets the additionality criteria, with carbon finance serving as the key mechanism for overcoming the barriers to adopting sustainable grazing and land management practices.

PP has provided justification for the common practice in Section 3.5 of the PD and through expert opinion. / 12/ VVB confirmed that the demonstration and calculation of adoption rate has been done correctly through evidence provided.

The additionality approach used in this project has been checked in line with section 7 of the methodology/8/. It was confirmed that PP has appropriately demonstrated the additionality of the project.

3.3.6 Quantification of GHG Emission Reductions and Carbon Dioxide Removals

Quantification of baseline emissions

The project utilizes a comprehensive approach for estimating Soil Organic Carbon (SOC) stock changes, employing the RothC model to calculate the baseline carbon stocks across various sample units, such as ranches within the project boundary. The baseline SOC is modeled based on inputs from multiple data sources, including remote sensing technology, published soil maps, and synthetic weather stations, ensuring a robust and accurate representation of baseline carbon stocks. The remote sensing system used to determine soil organic carbon (SOC) weight percentage and bulk density is calibrated using ground-truth datasets from ICRAF's Land Degradation Surveillance Framework (LDSF), which has been rigorously validated since 2017.

This calibration dataset is critical in ensuring that the SOC estimates are accurate, with the added benefit of using various satellite data sources such as ESA's Sentinel and NASA's SMAP products, which provide global coverage and redundancy in case of satellite failures/24//94//95/. Furthermore, the project follows a rigorous validation and testing methodology for remote sensing models, splitting data into training and testing datasets to ensure reliability and accuracy in estimating SOC stocks/94/.

The approach's integrity is reinforced by cross-verifying climate zone and soil texture representations in both the calibration dataset and the project's initial instances. The remote sensing technology is aligned with IPCC climate zones and soil textures found in the project region, and careful attention is given to removing any outliers in the dataset to maintain accuracy. The methodology includes a detailed assessment of various environmental parameters such as rainfall, temperature, and soil texture, which are sourced from reputable datasets like ERA5-Land weather data and ISRIC's global soil maps /41//40//93//94/. Additionally, the soil carbon model is continuously monitored and recalibrated during future verifications if necessary, ensuring that new project instances or changes in soil texture are adequately represented.

To ensure that the RothC model accurately reflects baseline emissions, literature data closely matching the vegetation and climate characteristics of the ranches is incorporated, allowing the model to simulate SOC changes based on typical land management practices in the project area/94//93/. This validation process is further substantiated by a Model Validation Report (MVR), which provides additional insights into the model's performance and the correlation between baseline data and project sample units. The overall methodology for SOC estimation and the integration of diverse data sources demonstrates a well-calibrated, scientifically rigorous approach, enhancing the project's ability to accurately quantify carbon sequestration and ensure its alignment with project goals and standards /82//85//86//87//89//91//93//95/.

Quantification of project emissions

As assessed in the provided project description, the inclusion of Soil Organic Carbon (SOC) stock change within the project boundary aligns with the specified quantification methodology, Quantification Approach 1, from VM0042. This 'measure and model' methodology relies on the RothC model, which is calibrated to reflect the project scenario, ensuring alignment with Section 4.1 requirements. Input parameters, such as soil organic carbon stock, rainfall, and clay content, are sourced rigorously, meeting methodological stipulations for accuracy and uncertainty. For example, Boomitra's remote sensing technology provides SOC stock data, while climatic variables are derived from ERA5-Land weather data. These inputs are recalibrated and validated regularly, with SOC measurements taken every five years or more frequently to enhance accuracy. /95/.

The project's approach to bias correction in the RothC model, integrating remote sensing data to align model outputs with measured SOC changes, is particularly noteworthy. This ensures robust estimates of Emission Reductions (ERR). During the first monitoring period, the project leverages measured SOC stocks from both pre-project and post-monitoring stages to refine RothC simulations. This method offers a continuous recalibration cycle, ensuring that modeled SOC stock changes accurately reflect project-induced impacts /86//87//53/.

Additionally, the project adheres to ex-ante and ex-post data collection methodologies for various parameters, such as soil properties and monthly input of plant residues. The conservative modeling of baseline SOC changes (+0.17 tons/ha/year) versus project gains (+0.36 tons/ha/year) demonstrates a commitment to exceeding baseline expectations while maintaining methodological rigor. Overall, the outlined procedures and data sourcing reflect a robust framework for quantifying SOC changes and verifying project impacts within the boundaries of the prescribed methodology /8//94/.

Quantification of leakage

The project assessment indicates no expected direct or indirect leakage associated with the proposed activities, as the interventions are entirely in-situ and do not lead to emissions or displacement beyond the project boundary. The behavioral changes promoted, such as rotational and sustainable grazing, ensure that all manure remains within the project area and is evenly distributed, mitigating the need for synthetic fertilizers or external manure inputs. This practice aligns with VM0042's requirements and enhances soil health, plant nutrient availability, and livestock productivity. Scientific evidence from similar contexts, such as Kenya, demonstrates the benefits of rotational grazing, including improved pasture conditions, healthier livestock, and economic advantages for pastoralists. These improvements underscore the project's long-term sustainability and resilience against climate variability.

The project further mitigates leakage by including the entire legal area of participating ranches within the boundary, ensuring no livestock displacement outside the project area. Dedicated herders trained in grazing practices reinforce this approach, maintaining livestock numbers and preventing external emissions. The project also does not claim reductions in N_2O or CH_4 emissions related to enteric fermentation, ensuring that emission reduction credits are strictly based on actual project activities.

Livestock productivity remains stable, as evidenced by monitoring data (e.g., an average productivity change of 1.66% across participating ranches), and any potential declines exceeding 5% are addressed through rigorous recalibration processes, as outlined in VM0042. FAO’s guidelines and academic literature support the approach, indicating that regenerative agricultural practices contribute to sustained or improved livestock productivity over time. Overall, the project's strategies effectively address potential leakage risks, maintaining environmental and economic integrity while adhering to methodological requirements.

Vintage period	Estimated baseline emissions (tCO2e) (a)	Estimated project emissions (tCO2e) (b)	Estimated leakage emissions (tCO2e)	Estimated reduction VCUs (tCO2e) (c)	Estimated removal VCUs (tCO2e) (c)
10-Jan-2019 to 31-Dec-2019	-	-	-	-	-
1-Jan-2020 to 31-Dec-2020	(481.79)	15,742.46	0	0	5,245
1-Jan-2021 to 31-Dec-2021	8,893.49	25,079.53	0	0	5,210
1-Jan-2022 to 31-Dec-2022	21,117.43	36,135.41	0	0	4,297
1-Jan-2023 to 31-Dec-2023	9,843.04	25,652.47	0	0	4,907
1-Jan-2024 to 31-Dec-2024	9,843.04	25,652.47	0	0	4,907
1-Jan-2025 to 31-Dec-2025	9,843.04	25,652.47	0	0	4,907
1-Jan-2026 to 31-Dec-2026	9,843.04	25,652.47	0	0	4,907
1-Jan-2027 to 31-Dec-2027	9,843.04	25,652.47	0	0	4,907
1-Jan-2028 to 31-Dec-2028	9,843.04	25,652.47	0	0	4,907
1-Jan-2029 to 31-Dec-2029	9,843.04	25,652.47	0	0	4,907

1-Jan-2030 to 31-Dec-2030	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2031 to 31-Dec-2031	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2032 to 31-Dec-2032	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2033 to 31-Dec-2033	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2034 to 31-Dec-2034	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2035 to 31-Dec-2035	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2036 to 31-Dec-2036	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2031 to 31-Dec-2037	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2038 to 31-Dec-2038	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2039 to 09-Jan-2039	*215.74*	*562.25*	*0*	*0*	*107*
Total	*187,233.57*	*487,959.12*	*0*	*0*	*93,371*

3.3.7 Methodology Deviations

The proposed deviation to use Equation 65 from VM0042 v2.0 instead of Equation 46 from VM0042 v1.0 for uncertainty calculation demonstrates a clear commitment to enhancing the accuracy and reliability of the project's quantification methodology. Equation 65 offers superior statistical rigor by calculating variance based on mean emission reductions across the project area, providing a more precise and unified measure of uncertainty. This approach contrasts with the less specific framework of Equation 46, which aggregates variances without adequately addressing their contributions to overall uncertainty.

3.3.8 Monitoring Plan

By employing a defined threshold within the probability density function of Emission Reduction Removals (ERR), Equation 65 allows for a more conservative and scientifically robust assessment of the project's achievements. Importantly, this deviation does not conflict with the monitoring or measurement criteria of the methodology, nor does it compromise the conservativeness of quantifying removals. Instead, it strengthens the project’s integrity by increasing the accuracy of calculations, ensuring reliable and conservative estimations that align with the methodological principles of VM0042. This adaptation reflects a forward-thinking approach to improving methodological practices while maintaining adherence to high standards of environmental accountability.

The monitoring process for the project is designed to adhere to the VCS methodology requirements, ensuring comprehensive and accurate measurement, recording, storage, aggregation, and reporting of data. An adaptive management plan is incorporated to address potential risks associated with the project, providing mitigation strategies for any unforeseen challenges. Boomitra plays a central role in project management and training, while ground partners focus on monitoring the activities of pastoralists and ranchers, conducting surveys, and supporting audits. To guarantee accurate and conservative GHG removal measurements, rigorous QA/QC procedures are implemented throughout the data collection and reporting phases. Capacity-building initiatives engage pastoralists and ranchers in the data collection process, enhancing their involvement in the project's success. Advanced technology, such as mobile applications and cloud-based systems, supports the verification of collected information. Key parameters related to land and ranching activities are systematically collected and verified, with all data securely stored in encrypted cloud storage for a minimum of two years after project completion. A multidisciplinary monitoring team, consisting of project managers, field workers, and IT professionals, collaborates to ensure precise data

collection and reporting. Boomitra has thoroughly developed the monitoring process in line with VCS requirements, and the detailed procedures are outlined below for further transparency.

The organizational structure and responsibilities outlined in this monitoring plan reflect a robust and collaborative framework designed to ensure effective project implementation and monitoring. Boomitra serves as the central project manager, coordinating efforts with ground implementation partners to achieve comprehensive monitoring and data collection objectives. Key responsibilities of Boomitra include defining monitoring parameters, developing quantification methodologies (notably involving remote sensing for soil carbon stocks), training field staff, establishing QA/QC protocols, and preparing monitoring reports. Meanwhile, the ground partners focus on direct ranch-level activities such as engaging with ranchers, collecting monitoring data, conducting training, and facilitating third-party audits /56//57//58//61//62/.

The plan's emphasis on oversight and accountability is evident in its dynamic MRV process, incorporating the latest scientific methods, high-quality satellite imagery, and QA/QC procedures to minimize errors and maintain data integrity. Internal auditing, biennial reviews, and standardized data collection formats further reinforce transparency and accuracy. Ground partners play a pivotal role in capturing field data and supporting Boomitra in fulfilling its responsibilities, with data ultimately analyzed and managed at the organizational level. Technological integration, including geospatial tools and cloud-based systems, enhances efficiency and scalability, ensuring detailed and accessible project records. The use of a unique land ID system simplifies tracking and validation processes, while the sampling protocols meet rigorous confidence standards, maintaining methodological robustness.

Overall, the monitoring structure combines scientific rigor with practical implementation strategies, leveraging partnerships, technology, and systematic planning to ensure accurate carbon stock measurements and progress tracking in alignment with project goals.

The 10-year baseline re-evaluation plan provides a structured framework for ensuring that the project baseline remains relevant and scientifically robust over time. By integrating expert consultations and prioritizing peer-reviewed data, it aligns baseline evaluations with best practices and local contexts. The approach ensures a systematic review of regional agricultural production trends, relying on credible scientific literature or government records as primary evidence sources. The inclusion of local expert input as a secondary measure underscores adaptability, particularly in data-scarce regions. Qualitative and quantitative data collection methods, as outlined, enhance stakeholder engagement—particularly through farmer surveys—while ensuring compliance with established standards such as VCS v4.5. This multi-tiered validation approach fosters credibility and ensures that the baseline accurately reflects contemporary practices and conditions, thereby promoting sustainable outcomes aligned with project objectives.

The modeling plan demonstrates a robust and scientifically validated approach by leveraging the RothC model, widely recognized for its applicability to grasslands under diverse management practices such as continuous and rotational grazing. By grounding its baseline conditions in continuous grazing of native grasslands and substantiating inputs with field-validated datasets, the plan ensures a strong foundation for accurate modeling. The integration of rancher consultations and signed attestations adds a layer of transparency and stakeholder participation, aligning with the VM0042 methodology requirements. These consultations, coupled with both quantitative and qualitative data collection, provide a comprehensive view of historical and current grazing practices, ensuring the model's initialization reflects real-world conditions.

The innovative use of remote sensing data to calibrate the RothC model enhances accuracy by periodically updating soil organic carbon (SOC) stock inputs at a minimum frequency of five years. This recalibration not only improves the model's reliability but also accounts for temporal variations in carbon dynamics. The propagation of remote sensing error through the model, with detailed uncertainty calculations as outlined in Section 4.4, underscores the commitment to methodological rigor. Furthermore, the periodic three-year verification frequency exceeds the minimum five-year requirement, ensuring timely and precise validation of SOC changes. This systematic approach, supported by extensive documentation and adherence to VMD0053 standards, positions the project for credible and transparent greenhouse gas emissions reduction reporting.

Monitoring plan for excluded GHG emissions

The project has implemented a robust and structured monitoring plan to ensure that all excluded GHG emission sources remain *de minimis* throughout the crediting period, in line with the VM0042 methodology. This plan includes continuous monitoring, field assessments, surveys, and cross-referencing of data sources to verify that these emissions stay below the required inclusion threshold.

Key components of the plan include:

- **Livestock Emissions:** Enteric fermentation and manure emissions are excluded due to stable livestock numbers. The project will conduct regular surveys and track livestock data to confirm that emissions remain negligible.
- **Fossil Fuel Combustion:** Annual surveys will monitor fuel use and mechanization levels among ranchers, with rental equipment records reviewed to ensure consistency with baseline conditions.
- **Nitrogen Inputs:** As there is no crop production or fertilizer use in the baseline, field assessments and annual surveys will verify that these practices remain absent in project areas.

- **Biomass Burning:** No burning is reported in the baseline, and the project promotes biomass retention. Satellite imagery, field inspections, and surveys will be used to detect any burning activity.

All monitoring results will be compiled in the monitoring report, ensuring early detection of any changes and timely corrective action to maintain compliance.

Data and Parameters available at validation

Data/ Parameter	Unit	Description	VVB assessment
AR	Percent	Weighted average adoption rate	The use of expert attestation to determine the weighted average adoption rate (AR) for the various project activities aligns with the flexibility allowed under Section 7 of the methodology. In the absence of region-specific evidence on existing adoption rates for these activities, the methodology permits reliance on expert opinion, ensuring that the assessment remains contextually relevant and methodologically compliant. The attested statement provided by the expert offers a detailed breakdown of adoption rates for activities such as improved grazing practices (10%), biodiversity conservation measures (1–5%), water management initiatives (1%), and capacity-building programs (5%). This approach is justified as it follows the methodology's guidance, specifically Footnote 12, which allows the estimation of combined activity adoption rates based on individual activity rates when comprehensive evidence is unavailable. The expert's attestation, signed and dated for accountability, strengthens the credibility of these estimates. The project's adherence to methodological requirements ensures that the common practice assessment is both rigorous and representative of regional conditions, facilitating accurate baseline setting and promoting confidence in the reported outcomes.

$Area_{an}$	Hectares	Area of proposed project-level adoption of each activity ay	The assessment of the project area for proposed activity adoption, totaling 211,375.9033 hectares, is consistent with the methodology's requirements for determining common practice. Section 7 of the methodology provides clear guidance for situations where regional evidence on the adoption of specific activities is unavailable, allowing reliance on expert opinion. In this case, the expert's attestation, signed and dated to ensure accountability, serves as a credible source for validating the proposed activity's area coverage. The inclusion of the entire area of each participating ranch demonstrates comprehensive adoption of rotational grazing practices, aligning with the project's goals to enhance sustainability and improve land management. By adhering to the methodology and ensuring full transparency with the Validation and Verification Body (VVB), the project ensures the reliability of its baseline assessment. This approach underlines the project's commitment to methodologically sound and regionally appropriate implementation of improved grazing practices across the designated area.
EA_{an}	Percent	Adoption rate of the y largest most common proposed project activity in the region	The adoption rate parameter ($EAan$), set at 10%, has been determined following the methodological allowance for expert opinion where direct evidence on the prevalence of a proposed activity is unavailable in the region. Section 7 of the methodology explicitly permits this approach, ensuring that data gaps are addressed in a systematic and transparent manner. The reliance on an expert's attested statement, signed and dated, lends credibility to the assessment while maintaining accountability. This parameter serves as an essential input for common practice assessment, allowing the project to establish a baseline adoption rate for the most common project activities in the region. By committing to provide the expert's details to the Validation and Verification Body (VVB) during

			validation, the project demonstrates a robust adherence to procedural requirements and reinforces the reliability of the data applied. This approach is both conservative and methodologically sound, ensuring that the project's calculations remain credible and aligned with industry standards
A_0	Hectare	Project area	The project area parameter ($A0$), quantified as 211,375.9033 hectares, has been determined through a rigorous and methodologically compliant process, aligning with Sections 3.11.1 and 3.11.2 of the VCS Standard v4.5. The use of geospatial field boundary mapping techniques, including advanced GIS tools, ground surveys, and remote imagery, ensures precise demarcation of eligible project zones. The methodology excludes non-eligible areas, such as roads, waterways, forests, and settlements, reinforcing the accuracy and integrity of the project boundary. The calculation of the project area utilizes the equal area projection EPSG:6933 in QGIS software, a standard and reliable approach for spatial data analysis. This ensures that all reductions and removals are quantified within accurately defined boundaries. The availability of KML files for validation adds transparency and traceability, allowing the Validation and Verification Body (VVB) to review the exact delineations. This robust geospatial approach guarantees that the project area measurement adheres to VCS standards, facilitating accurate baseline and project emissions calculations. Additionally, the provision for updating the table as new instances is added ensures flexibility and continued compliance throughout the project lifecycle
$P_{bsl,p}$	Livestock productivity (change in livestock	Average productivity of livestock p during	The baseline livestock productivity parameter (Pbsl,p) has been calculated based on reported data and surveys conducted with project-participating ranchers. The reported values—1401 for Kasanga, 3044 for Lisa Ranch & Game Sanctuary, and 1066

	rate - Population of grazing livestock in the baseline scenario)	the historical baseline period	for Machakos—represent the average productivity of livestock during the historical baseline period. These figures align with the methodological requirements outlined in Box 1 of the referenced standard. The methodology ensures that the baseline productivity data is credible by utilizing direct input from ranch-level records and surveys, reflecting the actual historical conditions of livestock productivity. The data collection process adheres to Section 8.4.3 and Equation 29, which are specifically designed to determine changes in livestock productivity for market leakage analysis in a transparent and methodologically sound manner. By employing rancher-reported data and surveys, this approach ensures that the baseline values are representative and robust, providing a reliable foundation for future assessments of livestock productivity changes and their implications for market leakage. The use of direct engagement with ranchers also enhances the authenticity and relevance of the data to the specific project context.
$P_{bsl,l,i,t}$	Head	Population of grazing livestock in the baseline scenario of type l in sample unit i in year t	The baseline livestock population parameter (Pbsl,l,i,t), measured in headcount, provides a comprehensive view of grazing livestock numbers across ranches in the historical baseline scenario. The reported data for 2016–2021, collected from ranchers in Kasanga, Lisa Ranch & Game Sanctuary, and Machakos, ensures accuracy and reflects real-world conditions. For instance, Kasanga's livestock population ranged from 1350 to 1500, Lisa Ranch & Game Sanctuary ranged from 3020 to 3090, and Machakos ranged from 1037 to 1229 during the observed years. This data was sourced directly from rancher attestation forms and management plans, a methodologically sound approach aligned with the requirements of Box 1 in VM0042. The methodology mandates using historical records to validate these figures, ensuring that they represent actual practices and trends during the baseline period. Additionally, monitoring

			protocols and herd census registers maintained by the implementing partner will further refine and validate these estimates at the verification stage. While this parameter primarily supports the calculation of baseline emissions, it is not directly applied in this project due to its focus on carbon removals through soil organic carbon (SOC) stock changes. However, the data serves as a critical benchmark to monitor and compare livestock stocking rates during the project scenario, ensuring no significant reductions that could compromise the project's integrity or environmental outcomes. This rigorous approach ensures compliance with the methodology and supports credible carbon accounting
$Days_{bsl,l,i,t}$	Days	Average grazing days per head in the baseline scenario inside sample unit l for each livestock type l in year t.	The parameter Daysbsl,l,i,t, representing the average grazing days per head in the baseline scenario, is reported as 365 days per year for all livestock types across individual ranches. This value is derived from rancher field data, with ranchers confirming that their livestock graze exclusively within the boundaries of their respective ranches throughout the year. This aligns with the prevailing practice in the region, where grazing occurs continuously on individually managed ranches. This parameter provides a consistent baseline for assessing livestock management practices and supports calculations related to baseline emissions. While it is not directly applied in the calculations for this project, as the focus is on carbon removals through soil organic carbon (SOC) stock changes, it serves as a valuable reference point. Specifically, it is used to verify consistency in livestock stocking rates between the baseline and project scenarios, ensuring that any significant reductions in grazing intensity are identified and addressed. By incorporating this parameter, the project adheres to the methodological requirements for monitoring livestock management, demonstrating transparency and ensuring the reliability of carbon removal claims.

DPM/RPM	Fraction	An estimate of the decomposability of the incoming plant material	The parameter DPM/RPM represents the decomposability of the incoming plant material and is used to estimate baseline emissions. The value applied is 0.67, which is the default value provided by the RothC model for unimproved native grasslands. This default value is based on the RothC model documentation, which is widely accepted in the scientific community for estimating carbon stock changes and soil organic carbon dynamics. The choice of this value is justified by the fact that it aligns with established recommendations for unimproved grassland ecosystems, where plant material decomposition is a key factor influencing carbon cycling. By using this model default, the project ensures consistency with recognized methodologies and maintains a conservative approach to estimating baseline emissions. This value is integral to calculating the carbon sequestration potential in the project, particularly in relation to soil organic carbon (SOC) stock changes.
OD	cm	Depth of Soil layer sampled	The parameter OD represents the depth of the soil layer sampled, with a fixed value of 30 cm applied in this project. This value is in accordance with the methodology requirements, which specify that soil samples should be taken from a depth of 30 cm for the purposes of estimating baseline emissions. The choice of a 30 cm depth is standard practice in soil carbon studies, as it captures a representative portion of the soil profile that is relevant for assessing soil organic carbon (SOC) levels, which are crucial for estimating baseline emissions and potential carbon sequestration. By adhering to the methodology's specified depth, the project ensures consistency and compliance with established protocols, thereby supporting the accuracy and credibility of its emissions estimates.

Data and Parameters monitored.

Data/ Parameter	*Unit*	*Description*	*Frequency of monitoring*	*VVB assessment*
AR	Percent	Weighted average adoption rate	Whenever new instances are added	The parameter AR represents the weighted average adoption rate, expressed as a percentage, and is used in the common practice assessment for this project. The value for AR is based on field monitoring data, and it is updated ex post whenever new instances are added to the project. The adoption rate is calculated as less than 20%, and no specific monitoring equipment is required for this parameter. To ensure data accuracy and reliability, internal audits are conducted yearly, as outlined in the project's monitoring plan. This procedure ensures that the adoption rate reflects actual practices, with careful review and validation of the data. The frequency of monitoring occurs as new instances are introduced, and the calculation method follows standard measurement practices. By implementing these QA/QC procedures, the project ensures that the adoption rate is accurately assessed and aligned with the overall objectives of the methodology.

$Area_{an}$	Unit area (hectares or acres)	Area of proposed project-level adoption of each activity	Whenever a new instance is added	The parameter Areaaan refers to the unit area (in hectares or acres) of proposed project-level adoption for each activity. The data for this parameter is derived from rancher records and project activity commitments. The measurement methods used to determine the project area for Areaaan and Ai comply with the requirements outlined in Sections 3.11.1 and 3.11.2 of the VCS Standard v4.5. To ensure accurate mapping of the project area, advanced geospatial field boundary mapping techniques are employed. These techniques use multiple points to create polygons in KML files, precisely delineating the project area while excluding non-eligible areas like roads, water bodies, and settlements. The area is estimated ex post and is subject to monitoring whenever a new instance is added to the project. Although no monitoring equipment is required, geospatial techniques, such as GIS coverages, ground survey data, and remote imagery (e.g., satellite or aerial photographs), are utilized for accurate measurement. All data collected is validated through internal audits, conducted annually as outlined in the

				monitoring plan. This approach ensures that the delineation of the project area is reliable, transparent, and compliant with VCS standards, supporting the common practice assessment for the project.
EA_{an}	Percent	Adoption rate of the n largest most common proposed project activity in the region	Whenever a new instance is added	The parameter EA_{an} refers to the adoption rate of the most commonly proposed project activities in the region, measured as a percentage. The data for this parameter is primarily sourced from field data collected on-site and supplemented by expert opinions. While specific measurement techniques are not outlined, the adoption rate is evaluated based on local knowledge and common practices in the region. The value for EA_{an} is applied ex post and is updated whenever a new project instance is added. There is no specialized monitoring equipment needed for this parameter, and the collection of data is supported by a robust QA/QC process. Geospatial techniques, including GIS coverages, ground surveys, and remote imagery, are employed to accurately delineate sample unit areas, ensuring that all datasets are geo-registered with corner points and clear landmarks. Additionally, an

				internal audit is conducted annually to validate the collected data, as specified in the monitoring plan. This systematic approach ensures that the adoption rates used in the common practice assessment are reliable and compliant with project requirements.
A_i	Unit area	Area of sample unit i	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years.	The parameter Ai represents the unit area of a sample unit within the project, which is determined within the overall project area. The measurement methods for determining this area comply with Sections 3.11.1 and 3.11.2 of the VCS Standard v4.5, ensuring that the project area is accurately delineated using advanced geospatial techniques. Geospatial field boundary mapping is employed, utilizing multiple points to create polygons in KML files that define the project zone. These files exclude non-eligible areas, such as roads, water bodies, and settlements, aligning with the project's defined boundaries. The area is measured using a combination of GIS coverages, ground survey data, and remote imagery, which are geo-registered with corner points or clear

				landmarks to guarantee accuracy and compliance with VCS standards. The delineated area is made available for validation, and any updates to the project area, including new instances, are recorded as part of the ongoing monitoring process. Monitoring of this parameter is required at least every five years or prior to each verification event. While there is no specialized monitoring equipment for this parameter, the data undergoes an internal audit every year, ensuring the consistency and reliability of the project area's delineation. The data is essential for calculating both baseline and project emissions and is measured in accordance with the project's monitoring plan.
i	Dimensionless	Sample unit: defined area that is selected for measurement and monitoring, such as a field	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter i represents a sample unit, which is a defined area selected for measurement and monitoring within the project. The sample unit is determined before the verification process and is crucial for assessing the project's baseline and emissions. The methods for determining the sample unit and project area comply with Sections 3.11.1 and 3.11.2 of the VCS Standard v4.5. Geospatial field boundary mapping techniques, including

				KML files, are used to demarcate the project area with multiple points that create polygons. These polygons accurately define the project zone while excluding non-eligible areas such as roads, water bodies, settlements, and other exclusions specified by the methodology. To ensure high accuracy, the delineation process combines GIS data, ground surveys, and remote imagery, all of which are geo-registered with clear landmarks or intersection points. This advanced geospatial approach guarantees that the project area is correctly delineated and eligible for the quantification of reductions and removals. The delineation of the project area is subject to an internal audit conducted annually, ensuring the integrity and accuracy of the data. Monitoring is required at least every five years or before each verification event, with the KML files available for validation. This parameter plays a vital role in calculating both baseline and project emissions and aligns with the overall monitoring plan.
i	Dimensionless	Type of fossil fuel combusted	Monitoring must be conducted at least every five	Please refer Box 1. Of VM0042 v1.0, Fossil fuel type is determined prior to verification.

			years, or prior to each verification event if less than five years	This parameter will be used to calculate baseline and project emission.
L	Dimensionless	Type of livestock	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	Parameter L refers to the type of livestock within the sample unit, and it is determined through rancher data collection. Monitoring of this parameter is conducted at least every five years or before each verification event, whichever is sooner. The data is collected through surveys, and these surveys are validated by the project manager before they are reported for verification. While this parameter is not used in any direct calculations within the project, it serves as an important monitoring tool. Specifically, it helps track any drastic changes in the livestock stocking rate, which could indicate leakage in the project scenario. This data is essential for assessing the broader impacts of the project on livestock management and ensuring that any potential shifts in livestock types or quantities are accounted for within the project's overall monitoring framework. QA/QC procedures ensure the integrity of the data by validating the surveys before submission, providing confidence in the accuracy of the data collected.

•	Dimensionless	Gas or pool	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter •, measured as a dimensionless unit, represents a gas or pool identified in sample unit i. While the specific details on measurement methods and procedures are not applicable for this parameter, it plays a key role in the calculation of both baseline and project emissions. Monitoring of this parameter is required at least every five years, or more frequently if needed for verification. However, no specific monitoring equipment or QA/QC procedures are outlined for this parameter. Its purpose is to provide necessary data for calculating emissions in the baseline and project scenarios, though the exact calculation method is not provided. This parameter's role in emission calculations underscores its importance in the broader context of monitoring and verifying project impacts on greenhouse gas emissions.
SF	Dimensionless	Type of Synthetic N Fertilizer	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	Please refer to Box 1. Of VM0042 v1.0, Synthetic Fertilizer type is determined prior to verification. This parameter will be used for Calculation of baseline and project emissions

$fSOC_{bsl,i,t}$	t CO_{2e}/unit area	Modeled soil organic carbon stocks pool in the baseline scenario for sample unit i at time t	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter fSOCbsl,i,t, measured in t CO2e per unit area, represents the modeled soil organic carbon stocks pool in the baseline scenario for sample unit i at time t. This data is generated through a combination of remote sensing techniques and the RothC model, with calculation methodologies outlined in the Carbon Focus Algorithm Theoretical Basis Document. The model utilizes input variables such as Var Absl,i,t and Var Bbsl,i,t to estimate the carbon dioxide emissions from the soil organic carbon pool. These modeled values are crucial for calculating baseline emissions and are derived using precise procedures to ensure accuracy. Monitoring of this parameter must occur at least every five years, or more frequently if needed for verification, with the use of remote sensing and RothC modeling as the primary tools. The data management process adheres to established QA/QC protocols, including those published by the FAO and the IPCC GPG LULUCF 2003, to ensure consistency and reliability. The soil organic carbon stocks at time t=0 is either directly measured or back-modeled from soil

				samples taken within ±5 years of the project's start date. In cases where direct measurements are not available, emerging technologies like remote sensing can be used, although with known uncertainty. This ensures the continuity of the baseline scenario throughout the project's life cycle. The calculated uncertainty of this data is 4.36 tons CO2e per hectare, as detailed in Section 4.4.1.2 of the project documentation. These values must be updated and reported at least every five years to ensure accurate emission calculations throughout the project's lifespan. 4o mini
$SOC_{bsl,i,t}$	t CO_{2e}/unit area	Areal-average soil organic carbon stocks in the baseline scenario for sample unit i in year t	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter SOCbsl,i,t, measured in t CO2e per unit area, represents the areal-average soil organic carbon stocks in the baseline scenario for sample unit i in year t. This data is derived using a combination of remote sensing techniques and the RothC model, with the calculation methodology detailed in the CarbonFocus Algorithm Theoretical Basis Document. The RothC model predicts carbon dioxide emissions from

				the soil organic carbon pool, incorporating variables such as Var Absl,i,t and Var Bbsl,i,t, which represent model input values in the baseline scenario. The model's output provides the baseline soil organic carbon stock for each sample unit, which is crucial for understanding the project's emission reductions over time. The frequency of monitoring and recording must occur at least every five years, or more frequently if required for verification. Remote sensing and RothC modeling are used as the primary monitoring tools. QA/QC procedures for soil inventory, including field data collection and data management, follow established standards from sources such as the FAO and the IPCC GPG LULUCF 2003. These protocols ensure the integrity and reliability of data collected in the baseline scenario. The calculation of soil organic carbon stocks at time t=0 is based on either directly measured soil organic carbon content and bulk density or back-modeled measurements taken within ±5 years of the project's start. Alternatively, emerging technologies, including remote sensing, may be used with known

				uncertainty, ensuring consistency in both the baseline and project scenarios throughout the project's lifespan. This parameter is essential for calculating baseline emissions and is updated every five years or as required.
$SOC_{wp,i,t}$	t CO_2e/unit area	Areal-average soil organic carbon stocks in the project scenario for sample unit i in year t	Monitoring and re-measurement conducted at least every five years, or prior to each verification event if less than five years	The parameter SOCwp,i,t, measured in t CO2e per unit area, represents the areal-average soil organic carbon stocks in the project scenario for sample unit i in year t. This data is obtained through direct measurement within the project area using remote sensing in conjunction with the RothC model. The RothC model calculates the soil organic carbon stocks in both the project and baseline scenarios, with detailed inputs specified in the CarbonFocus Algorithm Theoretical Basis Document. The modeling process involves the prediction of carbon dioxide emissions from the soil organic carbon pool, incorporating key variables such as Var Absl,i,t and Var Bbsl,i,t (representing model input variables in the project scenario). Soil sampling protocols and best practices outlined in the methodology are followed to collect the data, and

				standard QA/QC procedures for soil inventory, field data collection, and data management are applied. Recommended QA/QC practices include those from the FAO and IPCC GPG LULUCF 2003. Monitoring and re-measurement of SOCwp,i,t must occur at least every five years, or prior to each verification event if the interval is shorter. The purpose of measuring this parameter is to calculate project emissions, with calculations based on RothC and remote sensing data, as detailed in the CarbonFocus Algorithm Theoretical Basis Document. The model is initialized with initial soil carbon values from satellite remote sensing, which are then adjusted over time using weather time series and calibrated with final carbon stock values from subsequent remote sensing measurements. For transparency, soil organic carbon stocks at time t=0 are based on directly measured values or derived from measurements within ±5 years, ensuring consistent reporting throughout the project's duration.

$SOC_{wp,i,t-1}$	t CO_2e/unit area	Areal-average soil organic carbon stocks in the project scenario for sample unit i in year t	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter SOCwp,i,t-1, measured in t CO2e per unit area, represents the areal-average soil organic carbon (SOC) stocks in the project scenario for sample unit i in year t-1. The data is both modeled and measured within the project area. Measurement methods for this parameter align with those for SOCwp,i,t, as discussed above, and involve the use of the RothC model combined with remote sensing techniques. Monitoring and recording must occur at least every five years, or before each verification event if the interval is shorter. Quality assurance and quality control (QA/QC) procedures are aligned with those described for SOCwp,i,t. The purpose of monitoring SOCwp,i,t-1 is to facilitate the calculation of project emissions. The calculation method for this parameter, which integrates RothC modeling and remote sensing, is detailed in the CarbonFocus Algorithm Theoretical Basis Document.
$fCH4soil_{bsl,i,t}$	t CH4/unit area	Modeled methane emissions from the soil organic carbon pool in the baseline	Monitoring must be conducted at least every five years, or prior to each verification	Modeled methane emissions in the baseline scenario are determined according to the equation:

		scenario for sample unit i at time t	event if less than five years	$fCH4soil_{bsl,i,t} = \int_{CH4soil}(Var\ A_{bsl,i,t}, Var\ A_{bsl,i,t}, \ldots)$ where, $fCH4soil_{bsl,i,t}$ = Modeled methane emissions from the soil organic carbon pool in the baseline scenario for sample unit i at time t (t CH4/unit area) $\int_{CH4soil}$ = Model predicting methane emissions from the soil organic carbon pool $Var\ A_{bsl,i,t},$ = Value of model input variable A in the project scenario for sample unit i at time t (units unspecified) $Var\ A_{bsl,i,t},$ = Value of model input variable B in the project scenario for

				sample unit i at time t (units unspecified) See Box 1 of VM0042 v1.0 for sources of data and description of measurement methods and procedures to be applied to obtain values for model input variables.
$fN2Osoil_{bsl,i,t}$	t N2O/unit area	Modeled nitrous oxide emissions from the soil organic carbon pool in the baseline scenario for sample unit i at time t	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	Modeled nitrous oxide emissions in the baseline scenario are determined according to the equation: $fN2Osoil_{bsl,i,t} = \int_{N2Osoil} (Var\ A_{bsl,i,t}, Var\ A_{bsl,i,t}, \ldots)$ where, $fN2Osoil_{bsl,i,t}$ = Modeled nitrous oxide emissions from the soil organic carbon pool in the baseline scenario for sample unit i at time t (t N2O/unit area) $\int_{N2Osoil}$ = Model predicting nitrous oxide

					emissions from the soil organic carbon pool $Var\ A_{bsl,i,t,}$ = Value of model input variable A in the project scenario for sample unit i at time t (units unspecified) $Var\ A_{bsl,i,t,}$ = Value of model input variable B in the project scenario for sample unit i at time t (units unspecified) See Box 1 of VM0042 v1.0 for sources of data and description of measurement methods and procedures to be applied to obtain values for model input variables.
$\bar{\Delta}\bullet,t$ and $\bar{\bullet}\,t$	t CO_2e/unit area	Average emission reductions from pool or source •, or stock of pool •, in year t	Calculations and recording must be conducted at least every five years, or prior to each verification event if less than five years	The parameters $\bar{\boldsymbol{\Delta}}\boldsymbol{\bullet},\boldsymbol{t}$ and $\bar{\bullet}\,\boldsymbol{t}$, measured in t CO2e per unit area, represent the average emission reductions from a pool or source, or the stock of the pool in year t. These values are calculated based on data from the project area. The	

				measurement procedure does not specify direct data collection but relies on the calculations based on the Boomitra CarbonFocus Algorithm Theoretical Basis Document. Monitoring and recording of the calculations must occur at least every five years, or prior to each verification event if the interval is shorter. The calculated values are applied ex post, and the relevant calculation method is described in the aforementioned theoretical document. QA/QC procedures will be followed as per the calculation method in the document. These calculations serve the purpose of determining the emission reductions achieved by the project.
$FFC_{bsl,j,i,t}$	Liters	Consumption of fossil fuel type j (gasoline or diesel) for sample unit i in year t	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	Fossil fuel consumption can be monitored, or the amount of fossil fuel combusted can be estimated using fuel efficiency (for example l/100 km, l/t-km, l/hour) of the vehicle type and the appropriate unit of use for the selected fuel efficiency (for example km driven if efficiency is given in l/100 km).
$P_{wp,l,i,t}$	Head	Population of grazing livestock in the project scenario	Monitoring must be conducted at least every five years, or prior to	The parameter Pwp,l,i,t, measured in heads, represents the population of grazing livestock of type l in sample unit

		of type l in sample unit i in year t	each verification event if less than five years	i for year t within the project scenario. Data is sourced from project participant surveys, which are conducted once every two years. The procedure for collecting this data involves recording the number of grazing livestock by type. Monitoring is required to occur at least every five years, or prior to each verification event if the interval is shorter. The data is applied ex post and must be verified through direct consultations with ranchers or landowners, along with written attestations. Any quantitative information collected, such as livestock population, is supported by documented evidence (e.g., management logs, receipts, or invoices). This data is used for calculating project emissions.
$Days_{wp,l,i,t}$	Days	Average grazing days per head in the project scenario inside sample unit i for each livestock type l in year t	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter Dayswp,l,i,t, measured in days, represents the average grazing days per head for each livestock type in the project scenario, within sample unit i for year t. Data is sourced from project participant surveys and is used to track livestock grazing days by type. Monitoring of this data occurs at least every five years, or prior to each verification event if the interval is shorter. The data is reported ex post and is substantiated through direct consultation with ranchers or

				landowners, accompanied by written attestations. Any quantitative information, such as grazing days, is supported by documented evidence like management logs or receipts. This parameter is essential for calculating project emissions.
$LE_{,t}$	tCO2e	Leakage in year t;	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter LE,t, measured in tCO2e, represents the leakage emissions in a given year. According to the methodology's applicability conditions and Section 8.4, leakage emissions are considered to be zero for the project, making this parameter primarily a formality to confirm compliance. Data for this parameter is sourced through project participant surveys and is monitored at least every five years or before each verification event if the interval is shorter. While no specific monitoring equipment, measurement methods, or QA/QC procedures are applied, this parameter plays an essential role in verifying the absence of leakage in the calculation of project emissions. Additional details on leakage considerations are elaborated in the leakage section of the Project Design Document (PDD).

ΔP	Percent	Change in productivity	Every 10 years	The parameter ΔP, expressed as a percentage, represents the change in productivity over time. Data for this parameter is derived from project participant surveys, conducted every 10 years to track long-term productivity trends. Although no specific measurement methods, procedures, or monitoring equipment are applied, the parameter serves a critical role in assessing livestock productivity for leakage analysis. The initial value applied for ΔP is zero, and further details regarding its calculation and implications are provided in the leakage section of the Project Design Document (PDD). This parameter offers a baseline for understanding productivity changes attributable to project activities, facilitating the evaluation of potential indirect impacts on external systems.
P	Numbers	Determine the change in the population of the livestock to calculate average increase or decrease of the productivity.	Each year monitoring survey	The parameter P represents the numerical change in livestock population, which is used to calculate the average increase or decrease in productivity. Data for this parameter is obtained through annual surveys conducted with project participants. These surveys are aligned with the start date of each project activity instance,

				accounting for variations in livestock types across different areas. The value of **P** is applied ex post, and monitoring relies on surveys as the primary tool. Quality assurance and control (QA/QC) procedures are outlined in Section 5.3 of the Project Design Document (PD). This parameter is essential for calculating livestock productivity, providing critical insights into the impacts of project activities on productivity trends.
Pwp,p	Productivity (e.g., kg) per hectare	Average productivity for product p during the project period	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter Pwp,p, expressed as productivity (e.g., kg per hectare), represents the average productivity of a product during the project period. Data is sourced from farm productivity records, such as yield logs, and is measured using locally available technologies, including weighing devices, scales, or volume measurements. Monitoring occurs at least every five years or prior to verification events if the interval is shorter. Quality assurance involves direct consultations with farmers or landowners, supported by written attestations and documented evidence like logs, receipts, or equipment specifications. This parameter is critical for determining project productivity

				and evaluating market leakage risks. While the provided values are for ex-ante calculations, refinements may be made in the monitoring report before verification.
$Buffer_{,t}$	tCO_{2e}	Number of buffer credits to be contributed to the AFOLU pooled buffer account in year t	Monitoring must be conducted at least every five years, or prior to each verification event if less than five years	The parameter Buffer,t, measured in tCO2e, determines the number of buffer credits contributed to the AFOLU pooled buffer account annually. These contributions are calculated using the latest version of the VCS AFOLU Non-Permanence Risk Tool, ensuring alignment with current best practices and methodologies. Monitoring occurs at least every five years or before each verification if the interval is shorter, with contributions determined ex-post. Quality assurance and control (QA/QC) procedures involve strict adherence to the risk tool during every verification cycle. This parameter plays a critical role in calculating project emissions, ensuring the project accounts for non-permanence risks systematically and transparently.

3.4 Non-Permanence Risk Analysis

The non-permanence risk calculation sheet and report/16/17/ are provided by PP, the risk assessment was conducted according to the VCS " AFLOU Non-permanence Risk Tool" v4/7/.

Each risk category was calculated based on the VCS guidance. The information was validated and cross-checked through document review, onsite visits of the project area and interviews conducted. Details of the assessment are provided as follow.

The assessment of the Project Management Risk Factor demonstrates a well-organized and experienced approach to mitigating potential risks and ensuring the successful execution of the project.

Risk Factor (a): The project does not involve planting any non-native species or species unsuitable for the agro-ecological zones of the project area. It promotes sustainable grazing practices within the project region, as detailed in the project activity section of the PDD. This strategy ensures ecological compatibility and minimizes risks related to species introduction. Risk Rating: 0.

Risk Factor (b): There are no ongoing enforcement issues concerning the project area. The land within the project is owned by individual pastoralists or a community of pastoralists, with ownership verified through registered government land records. There are no external factors or factors requiring additional protection. Risk Rating: 0.

Risk Factor (c): The project management team possesses significant expertise in all necessary areas, complemented by well-trained implementation partners with a decade of regional experience. Training programs enhance the capabilities of staff and local community members involved in project implementation and monitoring. Since 2016, Boomitra has worked globally with pastoralist communities, fostering improved land management practices and innovative technologies. The project complies with all VCS criteria for management experience. Risk Rating: 0.

Risk Factor (d): The management team maintains a strong local presence, with implementation partners based in Kenya and familiar with the project area. Ground partners have long been engaged in promoting sustainable grazing practices to improve soil health and carbon sequestration. Most project areas are accessible within a day's travel. Risk Rating: 0.

Risk Factor (e): Boomitra's diverse team covers all aspects of project execution, including carbon project development, geospatial data analysis, and pastoralist engagement. The team's expertise spans over a decade, with a strong track record of successfully validated and verified projects under international standards. Local engagement is supported by software innovations, ensuring efficient participation and guidance for pastoralists. The project management is predominantly in-country through experienced ground partners. Risk Rating: -2.

Risk Factor (f): As a Validation and Verification Body (VVB), the adaptive management and monitoring plan presented demonstrates strong alignment with the Verified Carbon Standard

(VCS) methodology. The project exhibits a comprehensive framework for risk mitigation and long-term sustainability through its adaptive strategies, which are well-tailored to address environmental variability, including extreme weather events. The monitoring process is robust, incorporating systematic data measurement, recording, and reporting, supported by rigorous QA/QC procedures to ensure accuracy and conservativeness in greenhouse gas (GHG) removal quantification. Boomitra's oversight of project management and training, in coordination with local ground partners who handle field monitoring, surveys, and audits, provides a credible and decentralized approach to implementation.

The inclusion of capacity-building programs that engage pastoralists and ranchers in data collection and land-use planning adds participatory value and enhances local ownership. Furthermore, the integration of advanced technologies—such as mobile applications and encrypted cloud-based data systems—strengthens information verification, data security, and transparency. The commitment to data retention for a minimum of two years post-project ensures compliance with VCS record-keeping requirements. Notably, the adaptive management plan's emphasis on soil health monitoring, rotational grazing, and efficient water use demonstrates a proactive and climate-resilient approach. These measures collectively contribute to the integrity and sustainability of the carbon benefits generated. During the validation process, it is Section 5.3.16 of the Project Description (PD) was reviewed to confirm that all outlined practices are sufficiently detailed, operationalized, and supported by verifiable evidence.

Total Project Management Risk Rating: The cumulative risk rating for the project management component is less than zero, reflecting a robust and low-risk management approach. The project benefits from experienced leadership, reliable local partnerships, and comprehensive adaptive strategies to address potential risks effectively

Aassessment of Financial Viability Risk Factor

The financial viability assessment for the project indicates a low-risk profile, supported by strategic planning and robust financial mechanisms.

Risk Factor (a–g): The project's cash flow analysis reveals a breakeven point anticipated within 4 to 7 years from the current risk assessment. This timeline aligns with the analysis of the Internal Rate of Return (IRR) and reflects sound financial planning. The project does not require significant upfront investments, such as purchasing large equipment or land, as activities are implemented on individual grasslands. The financial structure ensures efficient use of resources with no substantial barriers to achieving financial stability. Cumulative Risk Rating: 1.

Risk Factor (h): The project has already secured more than 80% of the funding required to cover costs until breakeven, minimizing financial uncertainty. The absence of high capital expenses further enhances the project's financial feasibility. Risk Rating: 0.

The project has demonstrated strong financial viability by securing over 80% of the total funding required to cover all pre-breakeven cash outflows. There are no capital-intensive activities within the project scope that would require the purchase of large equipment or land. All project operations are carried out on individually owned grasslands, significantly reducing the capital burden. While the project recognizes certain investment barriers, the primary expenditures relate to fencing and paddock management. These costs are largely borne by ranchers through credit mechanisms, direct contributions, or support from Implementation Partners.

Importantly, the project does not depend on any additional revenue streams apart from the income generated through the sale of carbon credits. As a retroactive project with a start date of January 10, 2019, the revenue model is based on the issuance and sale of verified carbon credits.

Boomitra, the project proponent, is a fully funded Delaware Corporation with a stable financial foundation supported by strategic investor capital. The company has further secured long-term financial commitments through binding contractual agreements with buyers, which include advance payments for forward carbon credits. These multi-year contracts ensure guaranteed revenue streams for a significant share of the project's expected credit generation.

All funds necessary for the development, implementation, and verification of the project are fully allocated within Boomitra's strategic and operational budget. No funding gaps have been identified. As a result, the project meets the financial sufficiency criteria and is assigned a **relevant financial risk score of 0**.

Risk Factor (i): Project activities are funded through forward funding mechanisms or Memorandums of Understanding (MoUs) with carbon removal buyers. Boomitra is actively negotiating purchase agreements to further secure financial sustainability. These agreements provide a clear path for funding, ensuring a steady cash flow to support project implementation. Risk Rating: 0.

Total Financial Viability Risk Rating: The cumulative financial viability risk rating is 1, underscoring the project's sound financial planning, efficient funding strategies, and realistic breakeven timeline.

Assessment of Opportunity Cost Risk Factor

Based on the review of the project's justification and supporting documentation regarding opportunity cost risk under the AFOLU Non-Permanence Risk Tool v4.0, the VVB confirms that the project has appropriately selected **Option "d"** in Section 2.2.3 in NPRT/16//17/, Table 3. The project demonstrates through credible NPV analysis and peer-reviewed literature that the net present value (NPV) of the most profitable alternative land use—primarily large-scale maize and wheat farming, is within ±20% of the NPV of project activities involving rotational grazing. The evidence provided highlights that while crop farming may yield higher short-term returns, it is associated with long-term sustainability issues such as soil degradation and reduced resilience to climate variability. Conversely, rotational grazing delivers more stable and higher long-term returns, enhanced ecological benefits, and diversified revenue streams. Accordingly, a **risk rating of 0%** is justified under this criterion. Additionally, under criteria **g**, **h**, and **i**, the project has conservatively applied a **0% risk rating**, acknowledging that while agreements with implementation partners and ranchers exist and promote long-term adoption of regenerative practices, they do not constitute irrevocable legal commitments covering the full 100-year permanence period. Therefore, the total opportunity cost risk rating is appropriately calculated as **0%** and the assessment is consistent with AFOLU NPRT v4.0 requirements.. **Risk Score: 0**

Legal Commitment to Long-Term Management Practices

Boomitra has established legally binding carbon agreements with individual landowners (ranchers/pastoralists), which include an initial 10-year commitment, renewable in 10-year increments for a total duration of 30 years—surpassing the project's 20-year crediting period. These agreements irrevocably assign all rights to the generated carbon credits to Boomitra while legally mandating the adoption and continuation of improved grazing practices throughout the crediting period.

The project is also supported by 40-year agreements with Implementation Partners who provide monitoring, training, and ongoing community engagement. These partners are instrumental in ensuring adherence to the agreed-upon land management practices, particularly in remote or resource-constrained communities.

This legal framework is designed to ensure permanence and consistency in carbon stock protection throughout the project crediting period. Furthermore, the PDD outlines periodic reassessment of the project baseline every 10 years in line with VCS methodology, ensuring long-term relevance and adaptive management.

Although the Project Proponent (PP) has 40-year agreements with its implementation partners that set the overall project longevity, each rancher's carbon agreement currently runs for an initial 10-year term and is automatically renewable for up to 30 years. Section 2.2.4(6) of the NPRT v4.0 tool requires a minimum project longevity of 30 years, and the present rancher agreements meet this threshold through their legally binding renewals.

PP is actively working to convert these contracts into irrevocable 40-year agreements, so they fully match the partner commitments. Until those updated contracts are in place, the project is evaluated under Option (a) of Table 4 of section 2.2.4 of NPRT v4.0 ("without legal agreement or requirement to continue the management practice").

Since, the project is not protected by legally binding commitment to continue management practices that protect the credited carbon stocks over the length of the project crediting period, the risk rating for this section is 0.

Risk Score: -0

Permanence Beyond Project Lifetime (100-Year Commitment)

Although the project includes mechanisms to encourage long-term sustainability, such as vesting carbon payments over five years and strong involvement of trusted ground partners, there is **no legally binding commitment** to maintain the credited carbon stocks for a full 100-year period post-project. Nevertheless, several mitigation strategies have been adopted:

- Use of satellite-based monitoring for soil organic carbon (SOC).
- Promotion of sustainable practices that naturally support long-term carbon retention.
- Ongoing education and community reinforcement through ground partners.
- Maintenance of a buffer pool to account for any residual permanence risk, as per VCS standards.

Despite these strong non-legal mechanisms, the absence of a binding 100-year commitment limits the project's permanence rating.

Due to the lack of a legally enforceable 100-year continuation clause, the risk rating for this section is assigned as **0**, acknowledging residual permanence risks.
Risk Score: 0

According to Section 2.2.4.1 of the AFOLU Non-Permanence Risk Tool v4, project longevity refers to the continuation of activities that maintain carbon stocks beyond the defined project crediting period. This criterion applies where the project proponent can demonstrate that management practices responsible for GHG removals or reductions will persist after the issuance of credits.

Boomitra has satisfied this requirement by establishing **legally binding agreements** with both organizational partners and individual landowners that ensure long-term commitment to sustainable grazing practices:

Partner-Level Agreements are in place with Origination Partners and Intervention Coordinators for a period of **40 years (renewable)**. These agreements exceed the project's 20-year crediting period and secure the implementation of carbon-beneficial practices well beyond the minimum required timeframe. These partners are responsible for field-level engagement, project oversight, and technical support, ensuring continuity and permanence of GHG removal activities.

At the individual level, **Carbon Agreements** are signed between Boomitra and participating ranchers/landowners. These agreements have an **initial term of 10 years** from the project start date (2019), with automatic **10 year renewals**, up to a total commitment of **30 years**. This structure aligns with the VCS requirement for baseline reassessment every ten years and supports continued land management aligned with the project's emission reduction goals.

Through these agreements, landowners **irrevocably assign all rights, title, and interest to any carbon credits** generated on their land to Boomitra. In return, ranchers receive **carbon revenue through a vesting schedule and multi-year obligation**, providing both an incentive and a mechanism to ensure long-term adherence to improved grazing practices.

Evidence of project ownership, as required under **Section 3.7.1 (5) of the VCS Standard v4.5**, has been provided. The agreements include clear terms around benefit-sharing and legal commitments to maintain the credited carbon stocks for the full duration of the project's operational lifespan.

These contractual frameworks—spanning **30 to 40 years** clearly demonstrate that the management practices responsible for GHG removals will continue well beyond the crediting period. They also contribute significantly to the project's financial viability and permanence strategy.

Although the Project Proponent (PP) has established 40-year agreements with its implementation partners to ensure long-term project implementation, individual carbon agreements with ranchers are currently structured with an initial 10-year term and automatic renewals for additional 10-year periods, up to a total of 30 years. These agreements meet the minimum 30-

year project longevity requirement outlined in Section 2.2.4(6) of the AFOLU Non-Permanence Risk Tool (NPRT) v4.0 through their legally binding renewal clauses. However, as these agreements are not yet irrevocable for the full 40-year duration, the project has conservatively been assessed under Option (a) of Table 4 in Section 2.2.4 of the NPRT v4.0 applicable when there is no legally binding requirement to continue the management practice beyond the initial term. As a result, the project longevity score has been conservatively calculated as 16. The PP is actively working to align rancher agreements with the 40-year commitment already established with implementation partners.

The Risk Score for project longevity is 16.

Total Internal Risk Score is 13.

Land Tenure and Resource Access/Impacts Risk

The project ensures minimal risk associated with land tenure through legally binding agreements that delineate ownership and resource use. Land is owned by pastoralists/ranchers, while Boomitra holds ownership of carbon credits under valid agreements. These agreements effectively address ownership complexities and ensure compliance with sustainable grazing practices. The absence of disputes over land tenure or overlapping access rights further reinforces the low risk profile, yielding a total Land Tenure Risk Rating of 0.

Community Engagement Risk

The project integrates extensive community engagement strategies, including consultations with over 50% of ranchers in the project area and at least 20% of those within a 20 km radius of the project boundaries. Feedback from these consultations has been overwhelmingly positive, with no objections raised. Additionally, local communities are actively involved in project management, contributing to Sustainable Development Goals (SDGs) and economic well-being. This level of engagement results in a Community Engagement Risk Rating of -5, highlighting the project's positive impact.

Political Risk

Political risks are minimal, supported by Kenya's governance initiatives and policies promoting climate resilience and REDD+ projects. While the country's governance score of -0.53 reflects broader economic and political challenges, Kenya's efforts in addressing these challenges

mitigate significant risks to the project. The calculated Political Risk Rating is 2, ensuring the project's alignment with regional stability goals.

Natural Risks

The project demonstrates proactive measures to manage natural risks. Fire is not a significant threat to the region, and the potential for pest and disease outbreaks (rating: 0.50) is mitigated through integrated pest management practices. Extreme weather events, such as droughts or minor floods (rating: 1.25), are managed through water management and rotational grazing. Geological risks are negligible, as the project area faces minimal seismic activity. The Total Natural Risk Rating is 1.75, reflecting effective mitigation strategies.

A detailed Adaptive Management Plan has been incorporated as Appendix 4 of PD /1/ it was reviewed by the VVB and provided justification accordingly for further information refer Appendix V. A summary of this plan is included in Appendix 4 of the current Project Design document.

Overall Non-Permanence Risk Rating

With an Internal Risk of 13, External Risk of 0, and Natural Risk of 1.75, the project achieves an Overall Risk Rating of 15%. This assessment reflects the project's strong risk mitigation strategies and its capacity to sustain long-term carbon stock benefits.

The implementation of transparent agreements, robust community engagement, and proactive natural risk management highlights the project's commitment to sustainability and resilience.

4 VALIDATION OPINION

4.1 Validation Summary

Earthood Services Limited has been contracted by Boomitra Inc to validate the Project activity Boomitra Carbon Project (VCS ID 3340). The validation assessment has been completed and concluded after thorough assessment of PD, ER calculation sheet, evidence in line with the requirements of VCS standard, v4.5 and applied methodology VM0042, v1.0.

During the validation, 34 clarification requests (CLs) and 28 Corrective Action Requests (CARs) were raised and successfully closed. The review of the revised PD versions, the supporting documents and subsequent follow-up discussion provided adequate evidence to conclude the

closure of specified CARs and CLs. 02 Forward Action request (FARs) have been raised to be addressed at the time of verification.

No limitations or doubt were identified related to the validation of the project. The conservation approach and methodological choices used in the project design make it very likely that the project will meet the projected emissions reduction target.

4.2 Validation Conclusion

Earthood Service Limited has reviewed the project description documents and subsequently carried out site visit interviews to confirm the fulfilment of stated criteria. The project activity has currently correctly applied the baseline and monitoring methodology VM0042: Methodology for Improved Agriculture Land Management, v1.0 which is an approved methodology under the VCS programme and is acceptable under VCS version 4.5. The baseline has been determined in accordance with the stated approved baseline methodology.

As summary the validation team able to conclude that:

The project is in line with all relevant host countries' criteria and all relevant VCS version 4 program guidelines requirements.

The project additionality is sufficiently justified in the VCS PD.

The monitoring plan is transparent and adequate and in line with applied baseline and monitoring methodology of VM0042, version 1.0 and all the related tool VMD0053, version 1.0.

The calculation formulae and use of parameters for the project emission reductions estimation are transparent and in line with the requirement of the applied methodology. The ex-ante projection of emission reductions given is found to be appropriate, conservative and in the with the requirement. The estimated Emission Reduction - during the crediting period by the Project is the Project is expected to be *93,371* tCO2e over the 20-year project lifetime.

The conclusions of this report show that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation as outlined under VCS standard V4.5.

VVB declared that the validation of the GHG statement was conducted in accordance with Iso 14064-3: 2019. Earthood here concluded that the PD and its estimated emissions reduction calculations are in the with all criteria applicable for the validation against the VCS standard v4. The project activity is found to be eligible under Sectoral Scope 14. A reasonable level of assurance has been attained in this validation assessment. PP has provided sufficient evidence

and applied valid version of VCS documents. The AFLOU non permanence risk report applicable to calculating buffer credits. The NPR report and calculation tool has been prepared in line with the guidance of VCS NPR tool. It is concluded that the project is likely to achieve estimated GHG emission reduction or removal. Therefore, Earthood certify that the project meets all the requirements of the above-defined criteria and recommend registration of the activity.

Crediting period: *From 10-01-2019 to 09-01-2039*

Validated estimated GHG emission reductions and carbon dioxide removals for the project crediting period:

For projects required to assess permanence risk:

i) **Provide a conclusion on the following information:**

The non-permanence risk rating (%)	*15%*
If applicable, the Long-term Average (LTA), whether it has been properly updated, and if it has been reached.	*Not Applicable. There are no ARR and IFM activities involved in this project.*

ii) **Complete the table below for the project crediting period**

Vintage period	Estimated baseline emissions (tCO2e) (a)	Estimated project emissions (tCO2e) (b)	Estimated leakage emissions (tCO2e)	Estimated reduction VCUs (tCO2e) (c)	Estimated removal VCUs (tCO2e) (c)
10-Jan-2019 to 31-Dec-2019	-	-	-	-	-
1-Jan-2020 to 31-Dec-2020	(481.79)	15,742.46	0	0	5,245
1-Jan-2021 to 31-Dec-2021	8,893.49	25,079.53	0	0	5,210
1-Jan-2022 to 31-Dec-2022	21,117.43	36,135.41	0	0	4,297
1-Jan-2023 to 31-Dec-2023	9,843.04	25,652.47	0	0	4,907
1-Jan-2024 to 31-Dec-2024	9,843.04	25,652.47	0	0	4,907
1-Jan-2025 to 31-Dec-2025	9,843.04	25,652.47	0	0	4,907
1-Jan-2026 to 31-Dec-2026	9,843.04	25,652.47	0	0	4,907
1-Jan-2027 to 31-Dec-2027	9,843.04	25,652.47	0	0	4,907
1-Jan-2028 to 31-Dec-2028	9,843.04	25,652.47	0	0	4,907
1-Jan-2029 to 31-Dec-2029	9,843.04	25,652.47	0	0	4,907

1-Jan-2030 to 31-Dec-2030	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2031 to 31-Dec-2031	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2032 to 31-Dec-2032	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2033 to 31-Dec-2033	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2034 to 31-Dec-2034	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2035 to 31-Dec-2035	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2036 to 31-Dec-2036	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2031 to 31-Dec-2037	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2038 to 31-Dec-2038	*9,843.04*	*25,652.47*	*0*	*0*	*4,907*
1-Jan-2039 to 09-Jan-2039	*215.74*	*562.25*	*0*	*0*	*107*
Total	*187,233.57*	*487,959.12*	*0*	*0*	*93,371*

Approved by

Kaviraj Singh *Date: 08/07/2025*

CEO *Place: Gurugram, Haryana*

Earthood Services Limited

APPENDIX I: COMMERCIALLY SENSITIVE INFORMATION

Section	Information	Justification	Assessment method and conclusion
	Not Applicable	Not applicable	It has been verified through DR of PD through section 1.19.2 and site visit that most of the information are non-confidential and are available to stakeholders. Few information regarding forecasting model or financial budget is not openly available but it was provided to VVB for justification such as GIS model, etc.

APPENDIX II: ABBREVIATIONS

Abbreviations	Full texts
AFOLU	Agriculture, Forestry and Other Land Use
BE	Baseline Emission
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CO2	Carbon di oxide
CP	Crediting Period
DR	Desk Review
EI	External Individual
ER	Emission Reductions
ESPL	Earthood Services Limited
FAR	Forward Action Request
GHG	Green House Gas
Ha	Hectares
NNGO	Non-Governmental Organization
PAI	Project Activity Instances
PD	Project Description
PP	Project Proponent
RS	Remote Sensing
SDG	Sustainable Development Goals
tCO_2e	tonnes (t) of carbon dioxide (CO2) equivalent (e)
V	Version
VCS	Verified Carbon Standard
VCUs	Verified Carbon Units
VER	Verified Emission Reduction
VVB	Validation and Verification Body

APPENDIX III: COMPETENCE STATEMENT

Competence Statement			
Name	Ashok Gautam		
Country	India		
Education	M. Sc. (Environmental Sciences) M. Tech. (Energy & Environmental Management)		
Experience	16 Years +		
Field	Energy, Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS-I.D., AMS-I.A., AMS-I.C., AMS-I.E, AMS-II.D., AMS-II.G., AMS-III.E., AMS-III.H., AMS-III.Q, AMS-III.Z., AMS-III.AV., AMS III.AR, AM0029, AM0025, AM0056, ACM0001, ACM0002, ACM0004, ACM0012, ACM0006, AM0018, ACM0017, ACM0009, AM0034, AMS.I.B, ACM0016, AMS-III.BL, AMS-II.L, AMS-I.I., AMS-III.A.O., ACM0010, ACM0025		
Local expert	YES (India)		
Financial Expert	YES		
Technical Reviewer	YES		
TA Expert	YES (TA 1.1, TA 1.2, TA 3.1, TA 13.1 & 14.1)		
Reviewed by	Shifali Guleria	**Date**	18/10/2024
Approved by	Deepika Mahala	**Date**	18/10/2024

Competence Statement	
Name	Shreya Garg

Country	India		
Education	M.Sc. (Climate Science & Policy), TERI University		
Experience	9 Years +		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS.I.A., AMS.I.C., AMS.I.D., AMS.I.F., AMS.II.D., AMS.II.G., AMS.II.J., AMS.III.AV., AMS.III.BL, ACM0002, ACM0012		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (TA 1.1, TA 1.2, TA 3.1, TA 13.1)		
Reviewed by	Shifali Guleria	**Date**	21/12/2022
Approved by	Deepika Mahala	**Date**	21/12/2022
Competence Statement			
Name	Nepolion Borah		
Education	M.Sc. in Ecology & Environmental Science, Ph.D. in Forest Ecology		
Experience	13 Years + (4 years in Measuring and Monitoring Forest Carbon Stocks)		
Field	Forest Ecology and Climate Change		
Approved Roles			
Team Leader	NO		
Validator	YES		
Verifier	YES		

Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	YES (TA 14.1)		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	02/07/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	02/07/2024

Competence Statement			
Name	Tripti Pandey		
Education	B.Sc. Forestry M.Sc. Geoinformatics		
Experience	01 year 03 months		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	NO		
Validator	YES (VM)		
Verifier	YES (VM)		
Methodology Expert	NO		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee	NO		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	11/06/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	11/06/2024

Competence Statement			
Name	Waris Hooda		
Education	Master of Science (Geo-Information Science and Earth Observation) Bachelor of Engineering (Computer Engineering)		
Experience	2 years +		
Field	Geo-Information Science and Earth Observation (Specialization: Geo-informatics)		
Approved Roles			
Team Leader	NO		
Validator	YES		
Verifier	YES		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	02/07/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	02/07/2024

Competence Statement	
Name	Virginia Njeri
Country	Kenya
Education	Diploma (Business Management)
Experience	10+ Years
Field	Administration

Approved Roles			
Team Leader	No		
Validator	Yes		
Verifier	Yes		
Methodology Expert	No		
Local expert	Kenya		
Financial Expert	No		
Technical Reviewer	No		
TA Expert	No		
Reviewed by	Shifali Guleria	**Date**	14/12/2022
Approved by	Deepika Mahala	**Date**	14/12/2022

Competence Statement	
Name	Shifali Guleria
Education	M.Sc. (Environmental Studies and Resource Management), TERI University
Experience	3+ year
Field	Climate Change
Approved Roles	
Team Leader	YES
Validator	YES
Verifier	YES
Methodology Expert	YES (AMS-I.A., AMS-II.G., AMS-II.E., AMS-III.A.V., AMS-I.D, ACM0002)
Local expert	YES
Financial Expert	NO

Technical Reviewer	YES		
TA Expert	YES (1.2, 3.1)		
Reviewed by	Deepika Mahala	**Date**	18/02/2022
Approved by	Ashok Gautam	**Date**	18/02/2022

Competence Statement			
Name	Dr. Sadaf Nazneen		
Education	PhD (Environmental Sciences)		
Experience	5+ Years		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	NO		
Validator	YES		
Verifier	YES		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	YES (14.1)		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	11/09/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	11/09/2024

Competence Statement	
Name	Parul Srivastava
Education	PhD Forest Ecology and Environment M.Sc. Botany B.Sc. Botany and Chemistry
Experience	20 years
Field	Forestry
Approved Roles	
Team Leader	NO
Validator	NO

Verifier	NO		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (14.1)	YES		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	13/04/2023
Approved by	Deepika Mahala (Technical Manager)	**Date**	13/04/2023

APPENDIX IV LIST OF DOCUMENTS REFERRED

Ref no.	Author	Title	Reference to the document	Provider
1	PP	VCS Project Description (PD)	Version 4.0 Dated 19/08/2024	PP
2	VCS	VCS Project Description template	Version 4.3	Others
3	VCS	VCS Program Guide	Version 4.4	Others
4	VCS	VCS Standard	Version 4.5	Others
5	VCS	VCS Validation and Verification Manual	Version 3.2	Others
6	VCS	VCS Program Definitions	Version 4.2	Others
7	VCS	VCS AFOLU Non-Permanence Risk Tool	Version 4.0	Others
8	VCS	VM0042 Methodology for Improved Agricultural Land Management	Version 1.0	Others
9	VCS	VMD0053 Model Calibration Validation and Uncertainty Guidance for the Methodology for Improved Agricultural Land Management	Version 1.0	Others
10	World bank	Climate knowledge portal https://climateknowledgeportal.worldbank.org/country/kenya	Last accessed on 27/11/2023	Others
11	PP	ATBD Document Kenya Grassland	Version 3	PP
12	PP	Expert Opinion	Last accessed on 27/11/2023	PP
13	PP	Machokos Ranching details	Last accessed on 27/11/2023	PP

14	PP	Baseline Lisa Ranch	Last accessed on 27/11/2023	PP
15	PP	Baseline Lukenya Ranch	Last accessed on 27/11/2023	PP
16	PP	Non-performance-Risk calculation report	Last accessed on 30/06/2025	PP
17	PP	Non-performance-Risk calculation tool	Last accessed on 30/06/2025	PP
18	PP	Land Docs	Last accessed on 27/11/2023	PP
19	PP	Sensitization local stakeholder consultation	Last accessed on 27/11/2023	PP
20	PP	Attendance sheet of LSC	Last accessed on 27/11/2023	PP
21	PP	Feedback- LSC Kenya Grassland	Last accessed on 27/11/2023	PP
22	PP	PLA	Last accessed on 27/11/2023	PP
23	PP	Boomitra x AKWCA_Carbon agreement	Last accessed on 27/11/2023	PP
24	PP	LULC	Last accessed on 27/11/2023	PP
25	PP	SOP	Last accessed on 27/11/2023	PP
26	PP	Grievance book	Last accessed on 27/11/2023	PP
27	PP	Supplementary material ATBD Document.	Last accessed on 27/11/2023	PP
28	PP	Partner ethics policy and code of conduct	Last accessed on 27/11/2023	PP
29	PP	Kenya Grassland IRR/ER Sheets	Last accessed on 27/11/2023	PP
30	PP	Kenya Grassland ER Project_CTR_R1	Last accessed on 27/11/2023	PP

31	PP	LCA Response	Last accessed on 27/11/2023	PP
32	PP	Mara Response	Last accessed on 27/11/2023	PP
33	PP	CarbonFocus ATBD document	Last accessed on 27/11/2023	PP
34	PP	Kasanga_results Excel sheets	Last accessed on 27/11/2023	PP
35	PP	Lisa_Kenya_2019-2022 Excel sheet	Last accessed on 27/11/2023	PP
36	PP	Mulinge_kenya_2019-2022_results	Last accessed on 27/11/2023	PP
37	PP	Raw_carbon_value_kasanga	Last accessed on 27/11/2023	PP
38	PP	Raw_carbon_value_Lisa	Last accessed on 27/11/2023	PP
39	PP	Raw_carbon_value_Mulinge	Last accessed on 27/11/2023	PP
40	PP	LDSF Field Manual Jan 2f023	Last accessed on 27/11/2023	PP
41	World bank	https://climateknowledgeportal.worldbank.org/country/kenya	Last accessed on 27/11/2023	Others
42	Rangeland Science	Kipngetich Rotich, H., Symbua Mbau, J., Onwonga, R., Kipchirchir Koech, O. (2018). Vegetation Dynamics in Relation to Grazing Management Practices in Semi-arid Grazing Lands of Makueni County, Kenya. Journal of Rangeland Science, 8(3), 227-239. https://rangeland.borujerd.iau.ir/article_542803_942e25c8742c2874804118c541d7c4f1.pdf	Last accessed on 27/11/2023	Others
43	Plos One	Sui, Yuanyuan & Ou, Yang & Yan, Baixing & Xu, Xiaohong & Rousseau, Alain & Zhang, Yu. (2016). Assessment of Micro-Basin Tillage as a Soil and Water Conservation Practice in the Black Soil Region of Northeast China.	Last accessed on 27/11/2023	Others

		https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0152313		
44	ScienceDirect	Sheila Wachiye, Petri Pellikka, Janne Rinne, Janne Heiskanen, Sheila Abwanda, Lutz Merbold, Effects of livestock and wildlife grazing intensity on soil carbon dioxide flux in the savanna grassland of Kenya, Agriculture, Ecosystems & Environment, Volume 325, 2022, 107713, ISSN 0167-8809, https://doi.org/10.1016/j.agee.2021.107713. (https://www.sciencedirect.com/science/article/pii/S0167880921004175)	Last accessed on 27/11/2023	Others
45	PNAS	The Proceedings of the National Academy of Sciences (PNAS). (2019). Diversifying livestock promotes multidiversity and multifunctionality in managed grasslands. Retrieved from https://www.pnas.org/doi/pdf/10.1073/pnas.1807354116	Last accessed on 27/11/2023	Others
46	ScienceDirect	Conservancy is a legal entity initially registered under social service as a community-based organization and later upgraded their registration as a conservancy registered with the Kenya wildlife services T. Dunne, W.E. Dietrich, & D. Western. (n.d.). Effects of cattle trampling on vegetation, infiltration, and erosion in a tropical rangeland. Journal of Arid Environments. URL: https://www.sciencedirect.com/science/article/abs/pii/S0140196310002405?via%3Dihub	Last accessed on 27/11/2023	Others
47	EarthData Search	https://search.earthdata.nasa.gov/search/granules?p=C2484078896-LPCLOUD&pg[0][v]=f&pg[0][gsk]=-start_date&q=%20MCD12Q1%20&tl=1634797672!3!!&lat=-0.28125&zoom=0 Search, discover, visualize, refine, and access NASA Earth Observation data in your browser with Earthdata Search. Land Use Land Cover (LULC) maps for the region of interest (roi), which could be a state or a country, were prepared using the LULC	Last accessed on 27/11/2023	Others

		rasters of the Moderate Resolution Imaging spectroradiometer (MODIS) sensor retrieved data product MCD12C1.		
48	UNESCO	UNESCO. Kenya Lake System in the Great Rift Valley. UNESCO World Heritage Centre. https://whc.unesco.org/en/list/1060/	Last accessed on 27/11/2023	Others
49	ScienceDirect	Awiti, A. O., Hengl, T., Iwahashi, J., McBratney, A. B., Baumgardner, M. F., Ben-Dor, E., Erdas, Faraway, J. J., & Islam, K. (2013, October 22). Major soil and data types in Kenya. Developments in Earth Surface Processes. https://www.sciencedirect.com/science/article/pii/B9780444595591000116	Last accessed on 27/11/2023	Others
50	ESDAC	Republic of Kenya, Ministry of Agriculture Kenya Soil Survey, Nairobi. (https://esdac.jrc.ec.europa.eu/content/agro-climatic-zone-map-kenya-appendix-2-report-no-e1)	Last accessed on 27/11/2023	Others
51	Google earth	https://earth.google.com/web/@0,0,0a,22251752.77375655d,35y,0h,0t,0r/data=OgMKATA	Last accessed on 27/11/2023	Others
52	Boomitra Inc	https://boomitra.com/privacy-policy/ethics/#:~:text=Human%20Rights%20and%20Freedom%3A%20Boomitra,traditions%2C%20and%20culture%20of%20the	Last accessed on 29/11/2023	PP
53	Boomitra Inc	ER_Projection_PRR_R1_3340	Last accessed 14-10-2024	PP
54	Boomitra Inc	Dr Nkedianye CV	Last accessed 08-11-2024	PP
55	Boomitra Inc	Kenya Grassland Expert Opinion	Last accessed 08-11-2024	PP

56	Boomitra Inc	Machakos Ranching	Last accessed 08-11-2024	PP
57	Boomitra Inc	SKMBT_C36023091815440 - Baseline - Lisa Ranch	Last accessed 08-11-2024	PP
58	Boomitra Inc	SKMBT_C36023091815460- Baseline - Lukenya	Last accessed 08-11-2024	PP
59	Boomitra Inc	Boomitra x AKWCA_Carbon agreement	Last accessed 08-11-2024	PP
60	Boomitra Inc	Kasanga Carbon agreement	Last accessed 08-11-2024	PP
61	Boomitra Inc	lisa ranch carbon	Last acce63ssed 08-11-2024	PP
62	Boomitra Inc	Machakos Ranching Resolution	Last acces665sed 08-11-2024	PP
63	Boomitra Inc	Signed_EarthAcre_Boomitra - 2party PLA	Last accessed 08-11-206824	PP
64	Boomitra Inc	Kenya Grassland IRR - Boomitra	Last access69ed 08-11-207024	PP
65	Boomitra Inc	O Machakos Ranching Resolution (1) wnership documents	Last access71ed 08-11-207224	PP
66	Boomitra Inc	VCS3340_Justification of ownership	Last accessed 08-11-2024	PP
67	Boomitra Inc	VCS 3340-Demonstration of significance of GHG sources excluded or included	Last accessed 08-11-2024	PP
68	Boomitra Inc	2019 evidence (5)	Last accessed 08-11-2024	PP
69	Boomitra Inc	Evidence Flow - Kenya Grasslands	Last accessed 08-11-2024	PP

70	Boomitra Inc	ATHI-KAPITI WILDLIFE CONSERVANCIES ASSOCIATION (AKWCA) CAPACITY BUILDING FOR RANCHERS_ 2018	Last accessed 08-11-2024	PP
71	Boomitra Inc	Attendance sheet 2018	Last accessed 08-11-2024	PP
72	Boomitra Inc	Follow-Up Meeting Report_ Capacity Building for Ranchers	Last accessed 08-11-2024	PP
73	Boomitra Inc	Minutes 2018	Last accessed 08-11-2024	PP
74	Boomitra Inc	Training Report Capacity Building for Ranchers November 2018	Last accessed 08-11-2024	PP
75	Boomitra Inc	Local Stakeholder Consultation Invite List	Last accessed 08-11-2024	PP
76	Boomitra Inc	3340_Kenyagrasslands	Last accessed 08-11-2024	PP
77	Boomitra Inc	Kenya Grassland Model Validation Report v1_ACTIVE	Last accessed 08-11-2024	PP
78	Boomitra Inc	Kenya_Grassland_RothC_Validation_Report_Data_ACTIVE	Last accessed 08-11-2024	PP
79	Boomitra Inc	VCS-NPR Report_3340-KenyaGL_PRR1_Clean	Last accessed 08-11-2024	PP
80	Boomitra Inc	VCS-NPR Report_3340-KenyaGL_PRR1_TrackedChanges	Last accessed 08-11-2024	PP
81	Boomitra Inc	VCS-Risk-Report-Calculation-Tool-v4.0-Kenya Grasslands	Last accessed 08-11-2024	PP
82	Boomitra Inc	CarbonFocus ATBD_Kenya Grassland	Dated 25-10-2025	PP
83	Boomitra Inc	Training Report Capacity Building for Ranchers November 2018	Last accessed 08-11-2024	PP
84	Boomitra Inc	VCS-PD_Listing_NT_Kenya_Grasslands_CTR_V1.1_Clean	Last accessed 08-11-2024	PP

85	Boomitra Inc	full end-to-end calculations for one farm Kenya GL	Last accessed 08-11-2024	PP
86	Boomitra Inc	Kenya Grassland Model Validation Report_v1	08-11-2024	PP
87	Boomitra Inc	Kenya_Grassland_RothC_Validation_Report_Data_v1	08-11-2024	PP
88	Boomitra Inc	IPCC_Climate_Zone	08-11-2024	PP
89	Boomitra Inc	Keneya_grazing_literature_search	08-11-2024	PP
90	Boomitra Inc	Kenya_soilgrids_sampling_demo	08-11-2024	PP
91	Boomitra Inc	MVR_literature_pdfs	08-11-2024	PP
92	Verra	Verra Website - https://registry.verra.org/app/projectDetail/VCS/3340		VVB
93.	Earthood	GIS Assessment (KML)	Last 25/11/2024	VVB
94	PP	SOC reference document	Last 25/11/2024	VVB
95.	Earthood	On-site assessment	- Last 25/11/2024	VVB
96	PP	Double counting Declaration	Last 25/11/2024	VVB
97	PP	Baseline survey sheet	Last 25/11/2024	PP

APPENDIX V: ADAPTIVE MANAGEMENT PLAN

Risk	*Mitigation Strategies*	*Impact on Ranchers*	*VVB Justification*
Drought	*Rotational grazing, rainwater harvesting, efficient irrigation, training, cooperatives, access to subsidies and drought relief programs.*	*Enhanced resilience to forage and water shortages, reduced livestock mortality, financial support during stress periods.*	*The strategies demonstrate proactive planning and diversified risk mitigation aligned with NPRT v4.0. Training and cooperative engagement strengthen adaptive capacity at the community level.*
Flooding	*Improved drainage, elevated infrastructure, water diversion systems, riparian restoration, emergency plans, local authority collaboration.*	*Reduced livestock loss, infrastructure damage, and productivity disruptions during floods.*	*Mitigation measures are tailored to agro-ecological conditions and reflect best practices in rangeland hydrology and emergency response. Community knowledge-sharing enhances effectiveness.*
Wildfires	*Firebreaks, paddock management, early warning systems, fire response training, policy advocacy, and access to climate funds.*	*Reduced risk of fire damage, improved preparedness, and access to recovery resources.*	*Demonstrates comprehensive fire risk management and coordination with local communities and policy mechanisms, aligned with NPRT requirements on natural risk mitigation.*
Extreme Weather Events	*Emergency response planning, staff training, shaded areas, hydration points, feeding strategies, resilience workshops, policy advocacy.*	*Minimizes livestock stress and mortality during heatwaves or cold spells, ensures animal welfare.*	*The strategy covers both acute and chronic weather impacts, promoting long-term resilience and climate-smart livestock management—consistent with adaptive management best practices.*

Risk	*Mitigation Strategies*	*Impact on Ranchers*	*VVB Justification*
Pests & Disease Outbreaks	*Regular inspection, rotational grazing, sanitation, vet care, biosecurity, pest management, education, and continuous updates.*	*Improved livestock health, reduced losses, and enhanced productivity.*	*Comprehensive and systematic measures that address both prevention and response, enhancing long-term project viability and reducing reversal risk—consistent with NPRT's expectations for biological risks.*
Invasive Species	*Mechanical/biological control, native grass restoration, community awareness, NGO support.*	*Preserved forage quality and biodiversity, increased productivity.*	*Well-aligned with ecological restoration and biodiversity maintenance principles. Community awareness ensures broader coverage and risk mitigation.*
Community Engagement	*Grazing committees, regular training, mobile apps, lead ranchers, performance incentives, youth involvement, cultural alignment, NGO partnerships.*	*Increased participation, ownership, skill-building, and intergenerational sustainability of practices.*	*Strong participatory governance model that builds social capital and local capacity, reducing implementation risk—demonstrates compliance with NPRT v4.0's adaptive planning requirements.*
Implementation Failures	*Clear role assignments, ongoing training, app-based monitoring, targeted re-engagement.*	*Early detection and resolution of issues, improved project continuity.*	*Use of digital tools combined with human oversight ensures accountability and rapid intervention—mitigation measures are realistic and verifiable.*
Policy/Land Tenure Changes	*MOUs with ranches, engagement in planning, land mapping, law review, elder involvement, policy workshops.*	*Legal clarity and formalization of grazing rights, enhanced tenure security.*	*Multi-level engagement and formal documentation strategies mitigate risks from external policy shifts and ensure long-term land*

Risk	Mitigation Strategies	Impact on Ranchers	VVB Justification
			access for project activities.
Conflict/Insecurity	Peace committees, conflict resolution training, security risk mapping, regular assessments.	Safer working environment, reduced project disruption, strengthened local governance.	Social risk mitigation measures are well integrated, with proactive conflict analysis and community-driven mechanisms that reduce project vulnerability.
Technological Failures	Manual backups, multisource satellite data, offline apps, local tech training.	Reduced downtime in monitoring, improved data reliability, localized tech support.	Mitigation strategies ensure data integrity and continuity of MRV operations even in remote areas—compliant with technical risk requirements of NPRT.
Financial Disruption	Pre-financing, flexible disbursements, clear communication, market trend monitoring, focus on low-cost activities.	Continued operations despite payment delays, maintained rancher motivation and trust.	Financial risk is managed through diversification of funding sources and transparent communication, reducing the likelihood of project disruption—aligns with financial risk mitigation standards under NPRT.

APPENDIX VI: AUDIT FINDINGS

CL ID	01	Section no.	1.4	Date : 29/09/2023
Description of CL				
In the Section:1.1 of PD, 1. It is mentioned that *"The zones categorized as semi-arid are under threat of turning into arid zones, while the arid zones are prone to dryness to the extent that pastoral activities will cease to be feasible in these zones in the foreseeable future[3]."* The reference provided here was checked, however, there is no supporting evidence for this statement. Please provide references to studies/data that was used for drawing this conclusion. 2. *There is an issue of incorrect placement of reference 5 weblink under reference 4. PP is requested to update the references in the footnotes in page no 4.* 3. *In the second paragraph of this section, it is mentioned that "being a tropical region, the Savanna grasslands are subject to prevailing conditions of low soil carbon". But it is not clear that as to does, being situated in a tropical region cause/correlate with the" prevailing low soil carbon. Therefore, PP is requested to provide suitable references to support this statement.* 4. *In the last paragraph of this section, it is mentioned that "The total emissions reductions from this project instance 01 is 14,204,968 tons of CO_{2e} after deducting buffer credits".* a. *PP is requested to mention the name of the location, project area and boundaries of this project instance very briefly.* b. *Please clarify the time period to which this statement pertains to.* c. *Further, since this is a PD, therefore, according to the template requirements, it should state, "• An estimate of annual average and total GHG emission reductions and removals."* d. *Please update the PD to clarify that this refers to the estimated ERRs and not the achieved ones (the assessment of achieved ERRs is carried out based on the monitoring report(s)).*				
Project participant response				**Date :** 25/10/2023
1. In the reference mentioned, please check the following section of the reference: The Major **Challenges of The Agricultural Sector > Climate change.** This sub-section mentions how non-seasonal rains in Kenya have caused problems. There is a bimodal rainy season in Kenya. This means that average yearly rain is 400mm, leading to frequent drought and they take away one of every three seasonal crops. This is causing threat of turning categorized semi-arid zones to arid zones. We have included a reference to justify the statement. **2.** We have added the weblink for reference 4. **3.** Reference added. The sentence has been revised with suitable reference. 4. Updated the PD and ERR sheet.				
Documentation provided by project participant				
ER Emissions – Kenya Grasslands Revised PD				
DOE assessment				**Date:** 17/11/2023

1. In the updated PD, the audit team could not find any reference in support for recognizing the project area as semi-arid zone. Moreover, the project is not only implemented in Kenya, but also Tanzania and Uganda. Therefore, the finding is still open, and PP is requested to provide suitable reference in this regard. 2. In the updated PD, the audit team could not find any reference. Therefore, the finding is still open, and PP is requested to provide a suitable reference. 3. The audit team did not find any reference in this section (1.1) of the revised PD. But, the statement/sentence has been revised and the audit team accepted the revised statement and closed the finding. 4. The audit team has checked the updated PD and ERR sheet and close the finding.
Project participant response **Date:** DD/MM/YYYY
1. New reference (https://climateknowledgeportal.worldbank.org/country/kenya) has been added for Kenya region. Also please refer footnote 2, Page 225, figure 3.2, this mentions that in African continent we find arid and semi-arid areas. 2. The Section has been revised and modified to match the template requirements *"(no more than one page)"* criteria. Hence the information is moved to baseline section of the PD.
DOE assessment **Date:** DD/MM/YYYY
1. The audit team has checked the updated PD and found the mentioned reference supporting that the project area is in a semi-arid zone. Therefore, the finding is closed. 2. PP has described the summary of the project in one page and detailed explanation are mentioned in the baseline section of the revised PD. The audit team closed this finding.

CL ID	02	**Section no.**	3.2	**Date :** 29/09/2023
Description of CL				
1. In the Section 1.8 of the PD, the project starting date is mentioned as January 1, 2019. PP is requested to provide supporting document/evidence for this. 2. In the section 1.10, the project scale table is not complete. PP is requested to be consistent to the VCS PD template.				
Project participant response				**Date :** 25/10/2023
1. The folder having the evidence to prove the start date is available in the folder and this includes the justification as well. 2. The Project Scale table is updated.				
Documentation provided by project participant				
Start Date Evidence Kenya - Grasslands				
DOE assessment				**Date:** 17/11/2023
1. PP has provided receipts for purchasing fencing posts, nails, other materials in month of January and February 2019. But none of these items were purchased on 1st January 2019. But the project starting date is claimed as 1st January 2019. The provided receipts do not support the project starting date. Therefore, this finding is still open, and PP is requested to provide other evidence that supports the project starting date (01/01/2019). 2. In the revised PD, project scale table is complete, and the finding is closed.				
Project participant response				**Date :** 20/11/2023

1. The invoice of purchase of fencing poles dated 4th January is considered as the start date of the project. The ER sheet has been updated with the revised start date. Start date has been modified to 4th January 2019 in all related documents.
DOE assessment **Date:** 22/11/2023
1) PP has corrected the Project start date 4th January 2019. PP has provided the reciept of purchasing of fenching posts as supportive evidence for the project start date. The finding is closed.

CL ID	03	**Section no.**	3.3.6	**Date :** 29/09/2023
Description of CL				
In the Section 1.11 of the PD, 1. It is mentioned that "The grassland ownership unit is divided into organized grazing zones roughly similar in livestock carrying capacity. (Having the same livestock carrying capacity is not always synonymous with having the same area. When there are significant differences in vegetation between different parts of a region, they can be very different)." But it is not clearly understood, what PP wanted to explain. Please clarify. 2. In the second point of rotational grazing, it is mentioned that "Livestock cycle between different grazing zones and will spend anywhere from a single day to several months in a single grazing zone, to prevent overuse of any single grazing zone." PP is requested to clarify how is the livestock cycle for different grazing zones decided upon, and what is the frequency for reassessing it, if any. 3. Under the rotational grazing head, it is mentioned that "Herds confined to a grazing zone also produce concentrated hoof impacts on the soils within the grazing zone, breaking up harmful surface crusts that promote sheet erosion and decrease rainfall infiltration." a) PP is requested to clarify, the tradeoff between prevention of sheet erosion, and decrease in rainfall infiltration. b) While intuitively, prevention of soil erosion will allow accumulation of soil carbon and increase soil fertility, please explain the impacts of decreased rainfall infiltration since that can cause decline in productivity over time, especially since large parts of the project area is arid/semi-arid. c) Please provide references to further support this clarification as possible.				
Project participant response				**Date :** 25/10/2023
1. In this project, primary activity is rotational grazing which means the land is divided into different sections/blocks/paddocks for livestock grazing. These sections are organized to roughly support the same number of livestock. However, it's essential to understand that having the same number of animals in each section doesn't mean the sections are the same size. This is because the grass and vegetation can vary significantly between different parts of the region, which can affect how much fodder is available for the animals. Sometimes, the vegetation and conditions can vary within a region, making the areas with similar livestock capacity quite different from one another in terms of size and characteristics. So, even if they can support the same number of animals, the sections may have different sizes due to differences in vegetation. *2)*				

3) Also, we would like to bring into attention several factors influencing the carrying capacity adopted by farm managers from different ranches. This includes the quality of vegetation, climate (especially precipitation), soil fertility and water availability. This results in variations in carrying capacity across the landscape. Further, the condition of the land is regularly assessed, which can result in adjustments to grazing intensity, stocking density and timing as needed to maintain ecological health and productivity. All of this is put into consideration in order to reduce soil erosion and general degradation.

4)

2. The livestock cycle for different grazing zones is determined by assessing each zone's carrying capacity, which is based on factors like vegetation, rainfall, and soil quality. A rotation schedule is established to prevent overgrazing and land degradation, specifying how long livestock can stay in a particular zone before moving to another. This schedule is regularly monitored, and if issues arise, adjustments are made. Periodic reassessments, which can occur annually or less frequently, inform potential adaptations to the rotation schedule to align with the land's condition. Local communities and herders often play a vital role in this process, drawing on their knowledge of the local ecosystem to make decisions about sustainable land use, ensuring a balance between livestock grazing and land regeneration. The key is to maintain a balance between livestock grazing and land regeneration to ensure sustainable land use.

3. a) The statement is highlighting a beneficial aspect of allowing herds to graze within confined zones. When herds graze within these zones, their concentrated hoof impacts break up harmful surface crusts on the soil. This is positive because it prevents or reduces sheet erosion, which is the removal of a thin layer of topsoil by water runoff. The breaking of these surface crusts allows rainfall to infiltrate the soil more effectively, which can be advantageous for the vegetation and ecosystem as it enhances soil moisture levels and promotes plant growth. The tradeoff, if any, would likely be related to the potential for soil compaction due to repeated trampling by the livestock. Soil compaction can reduce overall infiltration capacity and affect soil structure negatively. So, while breaking up surface crusts can be beneficial in terms of preventing sheet erosion and enhancing rainfall infiltration, it's essential to consider how intensive grazing and trampling by herds may impact soil compaction and the balance between these factors in managing grasslands sustainably. The key is finding the right balance between these potential tradeoffs to maintain a healthy ecosystem.

5)

6) b) In the context of Kenya's grassland scenario, preventing soil erosion is important for maintaining the health and fertility of grassland soils. However, the reduction in rainfall infiltration that can result from these erosion control measures can have significant consequences in this semi-arid region. With Kenya experiencing periodic droughts and water scarcity issues, decreased rainfall infiltration may exacerbate these challenges, leading to limited water availability for grasses and other vegetation in the grasslands. As water becomes scarcer, there's an increased risk of soil salinity build-up, negatively affecting the overall health and productivity of the grasslands. Furthermore, decreased rainfall infiltration could intensify competition for available water resources among grass species and potentially reduce the grasslands' carrying capacity for livestock, which are critical for many local communities. Therefore, it's essential to implement erosion control measures in conjunction with water conservation strategies like rainwater harvesting and sustainable grazing practices to ensure both soil health and the long-term sustainability of Kenya's grassland ecosystems.

7)

8) The herds confined to a grazing zone produce concentrated hoof impacts within the grazing zone that breaks up harmful crust and rather increases water infiltration as it increases soil permeability and reduces likelihood of sheet erosion and loss of top soils. The key work here is actually increase, not decrease.

9) *10)* c) Updated the references in the PD.
Documentation provided by project participant
Revised PD
DOE assessment **Date:** 17/11/2023
1. PP has clearly explained the rotational grazing practices being implemented in the PA and the audit team close this finding. 2. PP has mentioned that "the livestock cycle for different grazing zones is determined by assessing each zone's carrying capacity". But the audit team could not find how the carrying capacity of the grasslands were determined before the rotational grazing practice was started. Therefore, PP is requested to explain how the carrying capacity of each grassland or grassland zone was determined. 3. (a) PP has clarified the tradeoff between prevention of sheet erosion and decrease in rainfall infiltration. The audit team is satisfied with the explanation and close the finding. *11) (b) PP has* explained the impacts of decreased rainfall infiltration on soil health and grassland productivity. The finding is closed now. *12)* (c) PD is updated with reference for the statement. The finding is closed now.
Project participant response **Date :** 20/11/2023
1. The carrying capacity of each ranch is determined by certain parameters like forage availability by type and abundance, range conditions and vegetation, precipitation and climatic patterns, soil fertility, texture and moisture holding capacity, livestock breeds and types, abundance of wildlife and other herbivores. Grazing management usually approaches grazing planning through estimating the animal days (AD) of forage available throughout different seasons of the year, and allocating herds of known size, composition, and dietary requirement of livestock types. *13)* *14)* For our understanding, we have considered the following example from Athi-Kapiti Ecosystem: *15)* Scenario 1: 25% of ranch is 1.5 - 3.1 km from water source. Area considered: 4000 acres Average yield of fodder per ha: 300kgs per ha [4] 50% of fodder is accessible to wildlife and livestock [5] Calculation: 4,000acres x 25% x 300 kg/ha x 50% = 150,000 kg forage available in this zone Scenario 2: 5% of the ranch is > 3.0 km from water Area considered: 4000 acres Average yield of fodder per ha: 300kgs per ha

[4] https://www.fao.org/3/ad317e/AD317E05.htm

[5] Sircely, J., Gluecks, I. and Kimengich, N. 2020. ILRI Kapiti Plains Research Station: Grazing plan for early 2020. Nairobi, Kenya: ILRI. https://hdl.handle.net/10568/110843

100% is inaccessible to wildlife and livestock Calculation: 4,000 x 15% x 300 kg/ha x 0% accessible = kg of forage available in this zone. Note: The presence of both wildlife and livestock in the project area necessitates specific parameters for determining carrying capacity. Presently, we're monitoring wildlife and livestock numbers in a designated area to get the dataset to analysis and calculate the carrying capacity. By the first verification, we aim to calculate the complete carrying capacity and integrate it into the grazing plan.

DOE assessment	**Date :** 22/11/2023
PP has explained how the carrying capacity of the grasslands were determined with a suitable example. The finding is closed.	

CL ID	04	**Section no.**	3.3.6	**Date :** 29/09/2023
Description of CL				
In the section 1.11 of PD, page no 21, it is mentioned that "The conservancy benefits from a biodiversity conservation lease program facilitated by some donors, The program aims to empower communities by leveraging their natural resources, especially wildlife, livestock and landscapes. Communities have used the conservancy benefits to develop a pasture and grazing management plan." a) PP is requested to provide more details about this biodiversity conservation lease program, including the activities implemented under it, the local rules and regulations around such programs, details of the donors, and how does this program affect the activities implemented under the project that is being validated here. b) Also, please justify, how this arrangement does not entail to double counting.				
Project participant response				**Date :** 25/10/2023
The scenarios has been explained in detail in the revised PD.				
Documentation provided by project participant				
Revised PD				
DOE assessment				**Date:** 17/11/2023
In the revised PD, it seems that the statement is removed, instead of explaining the details of biodiversity conservation lease program. PP is requested to cause of removal of the biodiversity conservation lease program. Is this not relevant in the PA? please clarify it.				
Project participant response				**Date :** 20/11/2023
The Biodiversity Conservation Lease Program is not part of Boomitra project. Hence, this particular line has been removed from the PD as there are other pastoralists included in the project who are not a part of Biodiversity Conservation Lease Program. In the interest of facilitating all pastoralist groups to be part of this project, we removed the sentence from the PD				
DOE assessment				**Date:** 22/11/2023

PP has mentioned that Biodiversity Conservation Lease Program is not a part of project activity and therefore, removed the sentences from the PD. The audit team has closed the finding.

CL ID	05	Section no.	3.3.6	Date : 29/09/2023
Description of CL				
In the guiding principle agreed by communities to implement grazing plan (page no 24), 1. it is mentioned that "The parcels should not be fragmented or sold without notifying the conservancy management." PP is requested to clarify is this conservancy management constituted as a part of this project? Please explain its roles, composition and relationship with this project. 2. Under this it is also mentioned that "Open grazing lands are managed by landowners, and people who are not in part of the conservancy agreements are prohibited from grazing their livestock there". PP is requested to provide these agreements for assessment.				
Project participant response				**Date :** 25/10/2023
The above statements have been revised in the revised PD. Conservancy management is not part of this project. At the first Boomitra and its partner Earthacre decided to go with pastoralists who are part of Conservancy management structure (Biodiversity Conservation Lease Program). Now it has been decided to enroll all pastoralists within the region. Hence the above statement in PD has been revised.				
Documentation provided by project participant				
Revised PD.				
DOE assessment				**Date:** 17/11/2023
PD has been revised as the PP has decided to enroll all the pastoralists within the region. The findings are closed.				

CL ID	06	Section no.	3.3.6	Date : 29/09/2023
Description of CL				
In the table (page no 24), 1. PP is requested provide caption/title of the table. 2. In the table, third activity for first objective is mentioned as "*Encourage removal of fence for open land and communal pasture*" and outcome of this activity is "*Increase movement for both wildlife and livestock*". The potential positive impacts of this activity are understood, however please clarify as to whether the local stakeholders have any grievances/issues related to Human Wildlife Conflict that may have arisen/can arise in the future. Also, if so, then what are the redressal procedures? 3. In the table, impacts of third activity (*Development of water management techniques*) for the third objective is mentioned as "*Reduce erosion and trampling effects*". PP is requested that to clarify, how are water management techniques related to trampling effects.				
Project participant response				**Date :** 25/10/2023
1. Table title/caption has been updated.				

2. Boomitra and Implementation partners have the grievance mechanism established and the implementation partner is regularly monitoring the project activities. However, to reduce the wildlife and human conflict there are other arrangements within the communities like community monitoring of wild animals and early warning systems are established like having blinking lights near cowsheds and houses. This is one of the proven tricks in the region to keep predators away from the livestock and as well as humans.
3. Water management techniques can be related to trampling effects in several ways. Implementing effective water management, such as drainage systems, can help mitigate trampling effects by reducing soil erosion and compaction caused by foot traffic. Proper water management can also promote healthy vegetation, which in turn can provide a natural buffer against trampling impacts by stabilizing the soil and preventing further degradation. Additionally, some water management practices, like creating designated paths or boardwalks, can help channel foot traffic and protect sensitive areas from trampling, further reducing the negative effects on ecosystems.

16)

17) Water management techniques like creation of watering points and rotational grazing can help manage livestock access to water while minimizing trampling damage. If there are only one or two watering points for the region, then the livestock will concentrate in those few areas leading to overgrazing there and degradation of the land.

Documentation provided by project participant

Revised PD

DOE assessment	**Date:** 17/11/2023

PP has updated the title/caption of the table and explained grievance mechanism established and the implementation partner is regularly monitoring the project activities satisfactorily. PP also provides a reference for the water management techniques related to trampling effects. Therefore, all the three findings of this section have been closed.

CL ID	07	**Section no.**	3.2	**Date :** 29/09/2023

Description of CL

1. In the first paragraph of page no 54, it is written that "*As per the VCS Standard V4.2 requirement, local stakeholder consultations have been conducted across the project location*". PP is requested to clarify which version of the VCS Standard is being followed in this project.
2. In page no 54, under the Local stakeholder consultations section, it is mentioned that "*Through our local partners, the process of VCS registration and issuance and VVB site visits are explained*." PP is requested to clarify, what does he mean by this statement?

Project participant response	**Date :** 25/10/2023

1. When the consultations happened the VCS version 4.4 was in force. Now latest VCS Standard v4.5 is used. Updated the same in PD.
2. The above statement puts emphasis on stakeholder must be aware of the overall VCS registration and issuance process which involves site visits by VVB. Sentences are rephrased and explained in the PD.

Documentation provided by project participant

Revised PD.

DOE assessment	**Date:** 17/11/2023

PD is revised according to VCS standard v4.5 . The findings are closed.

CL ID	08	**Section no.**	2.5	**Date :** 29/09/2023
Description of CL				
In the table illustrating the criteria or risks assessed for this project (page no 57), assessment of column for the safe gourde principle "*Vulnerable groups involved*" and "*Support tenure and resource rights*" are empty. Please clarify.				
Project participant response				**Date :** 25/10/2023
Proper justification is provided in the revised PD in safeguard principal section.				
Documentation provided by project participant				
Revised PD				
DOE assessment				**Date:** 17/11/2023
Assessment of the safe gourde principle "*Vulnerable groups involved*" and "*Support tenure and resource rights*" are addressed in the revised PD. The finding is closed.				

CL ID	09	**Section no.**	3.5	**Date :** 29/09/2023
Description of CL				
Under the additionality section (page no 78), it is mentioned that "The many socio-economic and cultural barriers in the region hinder the adoption of new practices." PP is requested to clearly mention the socio-economic barriers that hinder the adoption of project activities.				
Project participant response				**Date :** 25/10/2023
Additionality section has been updated with detailed elaboration of the socio-economic and cultural barriers in the region hinder the adoption of new practices.				
Documentation provided by project participant				
Revised PD.				
DOE assessment				**Date:** 17/11/2023
The PP has updated this section satisfactorily and the finding is closed now.				

CL ID	10	**Section no.**	4.1	**Date :** 29/09/2023
Description of CL				
In Section 4.1 mentioned that soil clay content input for Roth C model will be used from secondary data source (ISRIC). ISRIC maps with 240 m spatial resolution provides information on pH, soil organic carbon				

content, bulk density, coarse fragments content, sand content, silt content, clay content, cation exchange capacity (CEC), total nitrogen as well as soil organic carbon density and soil organic carbon stock. This information are extrapolated from 230000 soil profile globally. But, for accurate and site-specific estimation of SOC by Roth C needs site specific soil texture input such clay content. If PP is used ISRIC clay content data in Roth C for estimating SOC, then he may use SOC data from ISRIC source map. What is the use of Roth C model. Moreover, from these extrapolated data from moderately low-resolution maps, how PP will justify the accuracy of the SOC estimation. Please clarify it.
Project participant response **Date :** 20/11/2023
Only the clay content is used from ISRIC for the RothC model input. Soil organic carbon (SOC), as indicated, is determined using remote sensing. The ISRIC data is static, not dynamic, so it is not suited for understanding changes in SOC. On the other hand, clay content in soil naturally changes very slowly with time – it does not undergo any significant changes on human timescales. In addition, this project is not doing any interventions that would cause clay content to change. ISRIC SoilGrids maps are to a 250m resolution, which is a reasonable resolution given the sizes of the participating ranches and pastoral lands. The RothC model is only used on an individual basis for each ranch, meaning that with 3 ranches in instance 1, the RothC model is run 3 distinct times with different inputs. The clay inputs naturally must represent the average clay content in that ranch, and there are several 250mx250m SoilGrids pixels within any given ranch, to average and use. As per the methodology, soil properties like clay that are inputs to RothC must be "Directly measured or determined from published soil maps with known uncertainty". SoilGrids is a published soil map, and has known uncertainty quoted with the dataset. The resultant accuracy of the RothC model due to the clay input is tied to its sensitivity to its clay input. This will be studied further in the Model Validation Report (MVR) at the time of verification, and contained in the model prediction error, which will be shown to be within the uncertainty thresholds required by the methodology. In this project, the RothC model is primarily used for the modeling of baseline emissions – the scenario of what would happen on a ranch if the business-as-usual practices were continued on the ranch. This produces a dynamic baseline, as required by the methodology. Using SOC data from ISRIC source map would not produce a dynamic baseline and is also not permitted by the methodology. RothC is also used for modeling intermediate years within a monitoring period for the with-project scenario, in order to obtain vintage breakdowns, but not the endpoints of the monitoring period, which are measured with remote sensing.
Documentation provided by project participant
NA
DOE assessment **Date:** 21/11/2023
Acknowledged. As the ISRIC dataset, despite its 250m resolution, serves as the best available option for the Kenya region, it may lead to certain overestimations due to its limitations when compared to remote sensing technology. To address this concern, PP is kindly requested to develop an additional plan that involves estimating the change in Soil Organic Carbon (SOC) using RothC as a response to project interventions. This plan should include a bias correction of the Emission Reductions (ERR) by accounting for the difference between RothC estimations by project activity intervention and those derived from remote sensing data.

PP is requested for clarification on this regard.
Project participant response **Date:** 22/11/2023
This plan for bias correction is already included under the followed VM0042v1 methodology – see the last paragraph of Section 8.1 – which requires a true-up of the RothC model based on the remote sensed SOC stock. In this project, this will be described further in the Model Validation Report presented at the time of verification and audited by the Independent Modeling Expert, as this 'bias correction' or true-up is a key component of how the RothC is calibrated/validated in the with-project scenario.
Documentation provided by project participant
DOE assessment **Date:** 22/11/2023
Noted. The details sought will be elaborated upon in the Model Validation Report during the verification process, subject to review by the Independent Modeling Expert. In light of this, FAR#01 has been initiated, resulting in the closure of CL#10.

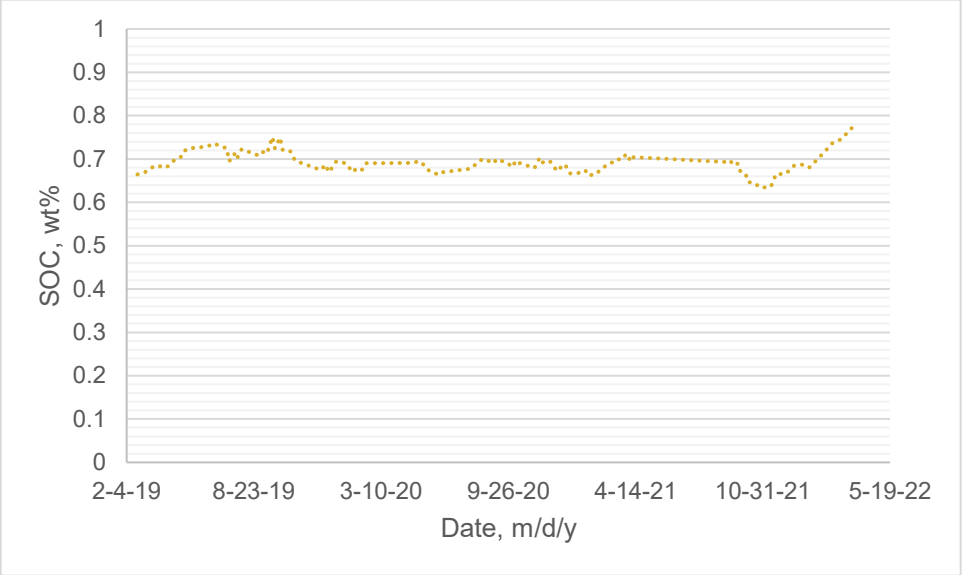
CL ID	11	**Section no.**		**Date :** 06/10/2023
Description of CL				
In the ATBD document on page 1, it is stated that the system's performance on a validation dataset allows for the discernment of grassland soil carbon levels within a 0 to 2 weight percent (wt%) range at a pixel level, achieving an RMSE (Root Mean Squared Error) of 0.25wt%. Nevertheless, considering the total weight percent range, this RMSE value appears to be relatively high. PP is requested to provide clarification on this aspect.				
Project participant response				**Date :** 20/11/2023
The root mean square error mentioned here is the error in prediction for a single satellite pixel. All the ranches in this project cover much more than one satellite pixel. When pixels are averaged across the entire ranch, the averaged error also improves significantly. Please see the sections on Frequentist (Section 5.1.1.1) and Bayesian (Section 5.1.1.2) error propagation in the context of this project, and observe how the error is much lower that 0.25wt% for actual ranches. As noted in Section 2, physical soil samples themselves can have measurement error up to 0.10wt% (particularly since there are no labs in Kenya doing dry combustion analysis) and furthermore there are sample errors due to the specific locations chosen for sampling. 0.25wt% for an individual pixel from remote sensing is on the same order as these errors present in physical sampling, and it primarily improves to a level of enabling observation of changes in SOC stock through the aggregation achieved from averaging across a farm. See the example at the end of Section 5 for further details on the observability achieved for the effect of SOC change, as quantified through a Bayesian approach.				
Documentation provided by project participant				
NA				
DOE assessment				**Date:** 21/11/2023

The 0.25 wt% error rate identified at the pixel level across ranches raises concerns regarding its alignment with conservative emission reduction standards. Clarification from PP is sought on this matter. Despite noting the reduced errors after averaging, it's crucial to highlight that discussions on error propagation techniques might not sufficiently tackle input errors, like sampling issues during model training. These unattended errors have the potential to undermine overall predictive accuracy, impacting the efficacy of emission reduction initiatives. If there are no labs in Kenya conducting dry combustion analysis, could you clarify why and how PP is comparing those test results while considering their associated error rates?

Project participant response	**Date :** 22/11/2023
The ERRs are computed from the change in SOC. Due to the structure of the modeling approach, the change in SOC thus calculated is tilted towards conservativeness as per standard requirements. As presented in Section 5 of the ATBD across several figures, the relationship between conventionally measured and remote sensed SOC values tends to be lesser than one, suggesting than a unit increase in SOC in the sample unit may actually be underestimated by the remote sensing model as being less than a unit – so conservativeness is maintained. Furthermore, please review the examples at the end of Section 5 of the ATBD. When propagated further, as seen in the Bayesian example, the error is 0.087wt% on a ranch level. As discussed in the ATBD sections on uncertainty, the error propagation techniques are able to properly account for input value errors and model imperfection errors, but cannot themselves take into account errors stemming from improper sampling of the training dataset prior to model training. This error is described as 'incomplete coverage of the domain' in the ATBD. This error is difficult to quantify with certainty, so as discussed in the ATBD, we must utilize proper QA/QC procedures for the dataset to ensure it has sufficient coverage. These QA/QC include ensuring that the full geographical/soil scope is covered, removing outliers, rebalancing the data etc. The VM42 methodology strongly recommends the usage of dry combustion when it is available. However, since it is not available in Kenya, we must make comparisons to the next available alternative. This project needs to substantiate that the monitoring with remote sensing will be comparable or better in accuracy, or more conservative than the conventional approach that may be applied. In the context of Kenya the conventional approach is not one of dry combustion but rather either Loss On Ignition (LOI) or Walkley-Black (WB) testing.	
Documentation provided by project participant	
DOE assessment	**Date :** 22/11/2023
Since, the current model prediction are based on sample collected by different agency wherein none of the sample falls within the project activity area. The error propagation and its reduction approach seem to be satisfactory however this shall need to be critically examined (involves comparison with remote sensing estimates) at the time of verification as mentioned in one of the pointer in FAR#01. With this CL#11 is closed.	

CL ID	12	Section no.		Date : 06/10/2023
Description of CL				
In the ATBD document "Carbon Focus Version 1.1," PP mentions that when examining Kenyan grasslands, they have observed typical carbon increments falling within the range of 0.05 weight percent (wt%) to 0.10 wt%, which translates to approximately 2-5 tons of CO2 per acre over a monitoring period, typically lasting around 4 years. It is noteworthy that this observed trend does not align with the estimated GHG (Greenhouse Gas) emission reductions or removals, as outlined in the table on page 13, section 1.10 of PD Version 1.0. Additionally, the trend analysis presented in Figure 16 on page 51 of the Carbon Focus ATBD Version 1.1 does not take into account any GHG reductions attributed to drought years. Further clarification is required to understand these disparities.				
Project participant response				**Date :** 26/10/2023
For the first question, please refer to the ER excel file, in the 'DATABASE' sheet, which contains details of the specific ranches enrolled in the initial instance. These ranches have about 0.08-0.10wt% in cumulative SOC increase over the first monitoring period as seen in Column F, which matches the 0.05-0.10wt% range mentioned in the ATBD. Column F directly feeds into the final GHG estimation as seen in the ER excel, and resultant table in the PD page 13. For the second question – the remote sensing of soil carbon does not take in the yearly weather pattern as an input to the calculation, as it is *not* a process-based model of carbon stock change, but rather a direct measurement of carbon levels at a given time. The effect of weather, including droughts, manifests itself indirectly through the change in carbon levels on the ground, which results in a different satellite measurement and resultant remote sensed SOC level. When there is a drought, carbon inputs in the soil decrease, leading to either stagnation or decrease in the soil carbon level. This will be picked up in the satellite data through changes in the appropriate satellite bands from the change in soil properties and will thus manifest in the SOC trend for the farm. In the specific case of Kenya, the region has been in drought since 2020 and this is seen in Fig 16 in how the increment from 2020 is not as high as in 2022.				
Documentation provided by project participant				
ATBD document v1.3				
DOE assessment				**Date:** 17/11/2023
The individual pixel's error rate at 0.25wt% is notably elevated despite the anticipated reduction through averaging processes over ranches. This higher error within individual pixels could significantly influence localized assessments, particularly in the estimation of Soil Organic Carbon (SOC) levels within the upper limit of 2 wt%. PP is requested to elaborate this discrepancy between individual pixel errors and the subsequent mean calculation, perhaps offering an illustrative example demonstrating how this impacts the precision of SOC estimations at smaller scales?				
Project participant response				**Date :** 20/11/2023
Please refer to the response to CL 11, which addresses the questions around the 0.25wt%. Furthermore, please refer to Section 5.1.1.1 and 5.1.1.2 in ATBD v1.3, which address illustrative examples on smaller scales, eg. 5 acre small areas. There, it is found in the frequentist and Bayesian analyses that the uncertainty on such a scale can drop below 0.1 wt%. Note that the ranches in this projects in instance 1 are much larger than 5 acres each – they span thousands of acres each. Furthermore, note that the best available labs in Kenya, eg. Cropnuts (cropnuts.com), perform wet				

chemistry or loss on ignition soil carbon analyses, which are only typically accurate to 0.1wt% themselves (dry combustion is not available in Kenya). Thus despite the technology being only 0.25wt% on individual pixels, it is as accurate or better than the best available conventional soil testing when applied on 5-acre scales. Further justification of these effects are presented in Section 5.1.1.1 and 5.1.1.2 in ATBD v1.3.
Documentation provided by project participant
Revised ATBD document v1.3
DOE assessment **Date :** 21/11/2023
The column F deals with soc_increase(wt %). PP is requested to provide the clarification on conversion formula from wt% to carbon_stock_increase_yearly per acre (ton CO2/acre). PP is requested to substantiate the claim with research papers or the model values data that the effect of weather, including droughts, manifests itself indirectly through the change in carbon levels on the ground, which results in a different satellite measurement and resultant remote sensed SOC level. When there is a drought, carbon inputs in the soil decrease, leading to either stagnation or decrease in the soil carbon level.
Project participant response **Date :** 22/11/2023
soc_increase is actually converted to total_carbon_stock_increase_per_acre. 'carbon_stock_increase_yearly per acre' is not a required calculation parameter in this project, and may be removed from the spreadsheet. The conversion from soc_increase (wt%) to total_carbon_stock_increase_per_acre (tons CO2e/acre) happens by multiplying soc_increase by: 1. 1/100, to convert the soc_increase % to a fraction 2. Bulk density in ton/m3, which must be determined as described in the ATBD 3. 0.50m, the soil depth used in this project 4. 4046 m^2 in an acre 5. 44/12 to convert from carbon to CO2e carbon_stock_increase_yearly per acre is simply calculated as total_carbon_stock_increase_per_acre divided by number of years in the monitoring period, but this parameter is not required for the final ERRs calculated in the project. The effect of drought can be observed in the model values data, as indicated. Consider the data for Kasanga ranch, one of the enrolled ranches in the project, after the weekly values are converted into a moving average:



Observe that there seems to be an apparent increase over the course of 2019. However there is a dip in 2020, followed by relative stagnation, up until 2022. Since 2020, the region has had multiple seasons of below average rainfall, but late 2021 seemed to have a bit more normal rainfall. See this report on 2019's extreme wetness (https://www.preventionweb.net/news/year-short-rains-never-stopped-kenya), 2020's drought start in the short rains period (https://reliefweb.int/report/kenya/kenya-2020-short-rains-season-assessment-report-february-2021) and this report on 2021 (https://reliefweb.int/report/kenya/kenya-2021-short-rains-season-assessment-report-february-2022)

Documentation provided by project participant	
DOE assessment	**Date :** 22/11/2023
Noted. PP provided indepth explanation for conversion of SOC wt% to tons/ha. In addition to this upon assessing the Kasanga ranch data, it is visible that the drought event is captured by the model which is subject to actual ground data comparison at the verification stage. Therefore, CL#12 is closed.	

CL ID	13	**Section no.**		**Date :** 06/10/2023
Description of CL				
In the ATBD document "Carbon Focus Version 1.1," PP acknowledges that moisture levels in the soil undergo frequent changes, often on a daily basis, due to factors such as rainfall, irrigation, plant absorption, and evapotranspiration. Additionally, it's noted that organic matter levels vary seasonally, and these shifts in organic matter can lead to noticeable changes in soil porosity by reducing compaction and increasing air content.				

However, it's important to consider that the SMAP data product used in this project provides data at a relatively coarse resolution. Given this coarse resolution, it raises the question of whether the micro-level variations in soil moisture and organic matter, which can have a significant impact on soil organic carbon (SOC) levels, are adequately captured. PP is requested to clarify if the measurements the extent to which these variations are accounted for in the SOC estimation process and whether the estimates are indeed conservative.

Project participant response	**Date :** 26/10/2023

All areas in this project are considered to be rangelands. In these rangelands, no irrigation is used, and the vegetation cover is generally annual and perennial grasses, with a few trees and shrubs, and not much variation across large distances. Given this context, the soil moisture in the rangeland does not experience a significant spatial variation due to irrigation (because there is none), plant absorption (because the vegetation is similar) and evapotranspiration (because the vegetation is similar). There may still be variation due to rainfall, and with rainfall being very location specific around the world, the effects of rainfall variations can be smaller than the SMAP data resolution. At the same time, these variations do tend to disappear relatively quickly as some of the excess rainwater infiltrates to deeper into the ground and the rest disappears as runoff across the whole area. This is one of the reasons that the yearly soil carbon value for reporting and ER calculation uses the dry months of the year for its calculation, so that these rainfall-induced variations will have disappeared and the SMAP data becomes more representative of the rangeland during the dry season.

Documentation provided by project participant

NA

DOE assessment	**Date:** 20/11/2023

Noted. PP is requested to provide substantiation regarding the claim that although the project area doesn't involve irrigation activities, variations in rainfall may significantly affect soil moisture pixel values due to factors like topography, soil type, and slope. It's essential to clarify this assertion. Additionally, if these soil moisture variations are deemed insignificant, clarification is needed on why they are included as training data for the model and within the calibration dataset.

Moreover, the confirmation of sample dates used for training data could not be established from the provided dataframe. Requesting PP to share the raw dataframe utilized for model training and testing to verify the sample dates. This access would help confirm the specific sample dates employed in the training dataset.

Project participant response	**Date :** 21/11/2023

Please see the new section on soil moisture in the ATBDv1.3 in Section 4.1.4. Topography/slope and soil type will definitely affect moisture retention ability. Over time in the dry months, without rain, the moisture levels will tend to stabilize for given topographic and soil conditions. Providing soil moisture as an input ultimately allows the model to learn for these conditions. Furthermore, as noted in ATBD Section 3, soil moisture is a key driver of dielectric constant. The machine learning model should at least understand how to be sensitive to the general level of soil moisture found within a given soil and slope condition. Only after learning this can the model learn how to be sensitive to soil carbon. For the purposes of achieving that idea of a general level of soil moisture, the coarse soil moisture is a good source of information as further explained in ATBDv1.3.

Sample dates are found in 2nd column of Kenya_ICARF_Idsf_AFSIS_calibration_dataset.csv file in Supplementary Data for ATBD folder
Documentation provided by project participant
DOE assessment | **Date :** 22/11/2023
Noted. The ATBD document is revised based on the clarification requested and the information available. It is also noted that only dry months data is collected and measured. At the time of verification PP will be required to provide the approach for accurate soil moisture data for ER calculation or modeled approach based on which the estimates can be derived at pixel level at par with other spatial resolution. This is added to FAR#01, and CL#13 is closed.

CL ID	14	**Section no.**		**Date :** 06/10/2023
Description of CL				
In the ATBD document "Carbon Focus Version 1.1," when PP mentions on page 18 that for grassland and using sufficiently long wavelength SAR (Synthetic Aperture Radar) bands such as C and L bands, the terms σ0v and σ0sv could be considered negligible, it's important to substantiate this claim with evidence or rationale. The assertion appears to suggest that certain scattering terms in SAR data are not significant for grassland applications with these specific wavelengths. To provide evidence or substantiation for this claim, PP should ideally include information or references that support the idea that σ0v (volume scattering) and σ0sv (double-bounce scattering) are indeed negligible in the context of grassland studies using C and L bands. This evidence could be based on prior research, empirical data, or theoretical modeling that demonstrates why these specific scattering terms can be disregarded when working with such radar wavelengths for grassland monitoring. This would enhance the credibility of the statement and its applicability to the specific context outlined in the document.				
Project participant response				**Date :** 26/10/2023
The ATBD has been updated with additional references in this section – with a citation to NASA's soil moisture ATBD that states the assumption, followed by an experimental study that also validates the assumption across multiple areas.				
Documentation provided by project participant				
Revised ATBD document				
DOE assessment				**Date:** 20/11/2023
PP is requested revise the document considering the absence of irrigation? Additionally, PP is requested to substantiate the assertion regarding the insignificant spatial variation in soil moisture due to the absence of irrigation, similar vegetation for plant absorption, and comparable evapotranspiration patterns, particularly in reference to the project area in Kenya. Furthermore, PP is requested to clarify the specific months for which predictions are being made to estimate the change in SOC (Soil Organic Carbon)?				
Project participant response				**Date :** 21/11/2023

All native grassland biomes do not have irrigation. The Grassland ATBD provided in this project has been drafted with that taken into account. Now Section 4.1.4 also provides further justification in line with the justification provided in CL 13. Please review the new paragraphs in Section 4.1.4 immediately prior to 4.1.5. These substantiate the assertion of insignificant spatial variation in soil moisture in reference to the kenya project area.

As mentioned in Section 5.1 of the ATBD, this project may use satellite data collected in December, January or February for the predictions. These months are a hot and dry period immediately after the 'short rains' season, and immediately before the 'long rains' season (See Fig 9 in PD for temperature and rainfall patterns in Kenya). In the specific context of the first monitoring period, January and February are used. Specifically, January and February 2019 is compared to January and February 2023.

Documentation provided by project participant

Revised ATBD document v1.3

DOE assessment	**Date :** 22/11/2023

Noted. Section 4.1.4 is revised in the ATBD V1.3. To summarize, the reference paper cited pertains to a hypothetical crop scenario with extensive green grass surfaces of uniform height. However, this research does not specifically focus on grasslands, which are the primary context of the project activity area. PP is requested to provide research work specifically focused on grasslands within the project area or in regions exhibiting similar topography and climatic conditions. This clarification is necessary to ensure the relevance and applicability of the referenced research to the project's context.

The second part of the clarification, refer to CL#33.

Project participant response	**Date :** 22/11/2023

The citation #51 is referenced simply to provide a citation for the theoretical framework of soil water balance. The soil water balance is a very common scientific framework used around the world in a variety of different contexts for agricultural land management, and one of the models used is that of a extensive green grass of uniform height. This is just a theoretical model. However, in practice, the crop water balance framework is found to work effectively across different land types. For example, there is an entire UN FAO guidance manual on water modeling that is used all over the world as a standard guideline in the soil moisture and irrigation field. The specific reference to soil water balance in that FAO guidebook is here - https://www.fao.org/3/X0490E/x0490e0e.htm#soil%20water%20balance . The whole guidebook is available here - https://www.fao.org/3/X0490E/X0490E00.htm . This is the standard theoretical framework, used around the world.

There's specific real-world validation for the satellite soil moisture provided in the reference #53, which includes several validation datapoints from grasslands and savannas as seen in the Land Cover column of Table 2. There's even a validation site in that reference that is within this grouped project's boundaries (#26). The ability of the coarse soil moisture to be validated against real ground points shows that it does provide useful information.

Documentation provided by project participant

DOE assessment	Date : 22/11/2023
The soil moisture within few fields and the sensor data needs to be verified at the verification stage. The reference cited will be then reassessed based on the actual results. This added to FAR#01. Therefore, CL#14 is closed.	

CL ID	15	Section no.		Date : 06/10/2023
Description of CL				
In section 3.1.1 of the ATBD document "Carbon Focus Version 1.1," PP provides broad details about the soil samples used but does not include quantitative information about the number of samples, their sources, and timelines. Additionally, it is requested that PP provides these samples for assessment and validation purposes. To improve transparency and ensure the credibility of the analysis, it's important for PP to provide more specific details regarding the soil samples used in the study. This should include: 1. Number of Samples: The document should specify the exact number of soil samples that were collected and analyzed as part of the study. This information is crucial for understanding the sample size and the statistical significance of the findings. 2. Sources of Samples: PP should clearly state where the soil samples were obtained from. This could include information on whether they were collected from specific geographic locations (Lat/Long), research institutions, field campaigns, or other sources like research papers (references required). 3. Timeline: It's important to provide the timeline for when the soil samples were collected. This includes the start and end dates of the sampling period. This information helps in understanding the relevance of the data to the study's objectives. By providing these quantitative details and making the samples available for assessment and validation, the study can be more robust, and the findings can be better scrutinized and validated thus enhancing the overall credibility of the estimates.				
Project participant response				Date : 26/10/2023
Please see Section 5.1 of the ATBD, which provides the (1) number of samples, (2) source and (3) timelines. The raw data is now provided as well in the accompany “Supplementary Materials for ATBD/Kenya_ICARF_ldsf_AFSIS_calibration_dataset.csv” file				
Documentation provided by project participant				
Kenya_ICARF_ldsf_AFSIS_calibration_dataset.csv				
DOE assessment				Date: 17/11/2023
PP is requested to clarify the number of samples falling within the project activity area. Additionally, a considerable portion of the dataset lacks timestamps, raising concerns regarding the temporal variability of soil data used for both model training and prediction further error propagation. Moreover, it is requested to provide evidence of data collection from the agency, partner, government body, or				

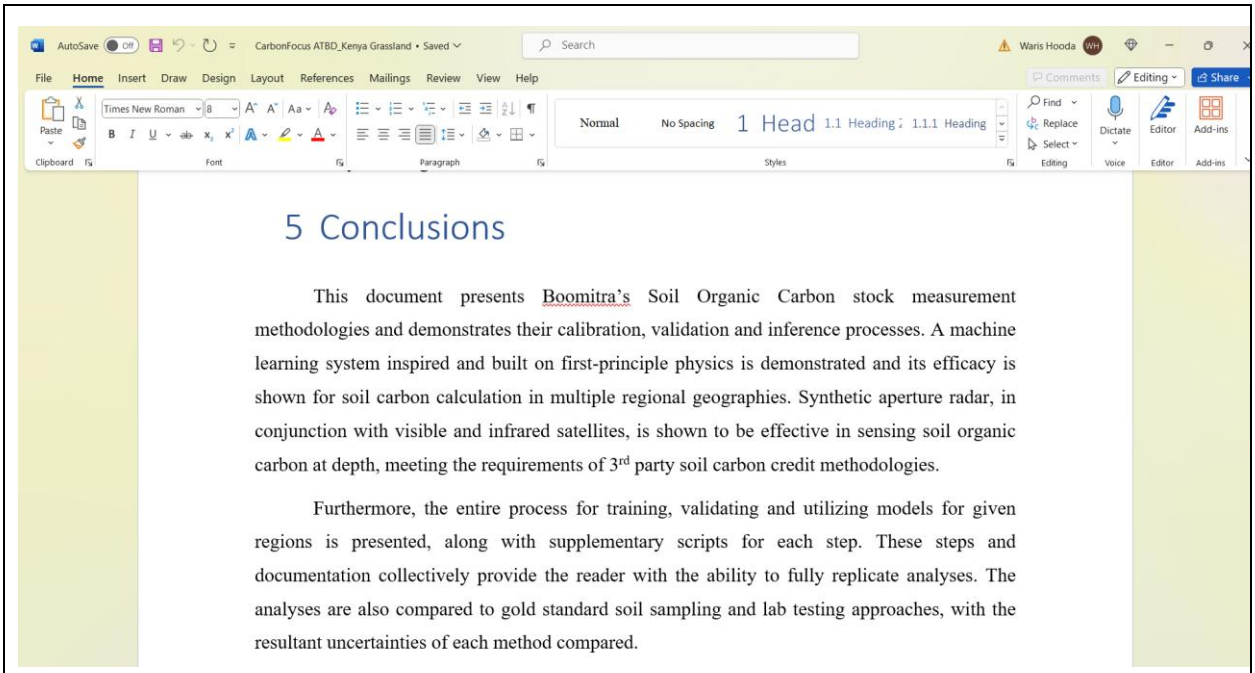
institution. If the ground data was sourced from a publicly available website, kindly provide the web link. There's a discrepancy between the ground samples available in Kenya_ICARF_ldsf_AFSIS_calibration_dataset.csv, totaling 616 SOC values, and the training dataset, which contains 1248 entries in KE Grassland_Test.csv. This doubling of ground samples in the training dataset requires clarification. Additionally, the test dataset also contains 60 SOC values, raising questions regarding the source and consistency of these additional entries. PP is requested to provide clarification on this discrepancy between the ground samples in the provided datasets?
Project participant response **Date :** 20/11/2023
All soil samples fall within the grassland regions of Kenya, but currently, 0% of the samples fall within the current project activity area of instance 1 of the project. Soil sampling within the current project activity area is planned to be done prior to the first verification. This sampling will primarily be used as a further validation dataset for the remote sensing results – to compare the results of the remote sensing with the lab-measured values. The full data used for this project (Kenya_ICARF_ldsf_AFSIS_calibration_dataset.csv) has timestamps, which stretch across several months across the year, including the months used in the final carbon analysis (Dec, Jan, Feb). As mentioned in the ATBD, the soil test data sources for the ML system for this region are from one primary source, the International Council for Research in Agroforestry (ICRAF), a CGIAR lab. CGIAR is a global network of prestigious research institutions focused on agriculture. ICRAF uses the Land Degradation Surveillance Framework (LDSF)[6] system for soil sampling, mostly followed by Walkley-Black testing at Rothamsted Research[7]. Rothamsted research is one of the premier institutes for soil science in the world. The data may be downloaded as well from the ICRAF soils dataverse: ICRAF Soil and Land Health Theme (worldagroforestry.org) – which is cited in the footnote reference 3 below. Regarding the apparent increase in data samples between the 'Kenya_ICARF_ldsf_AFSIS_calibration_dataset.csv' and KE Grassland_Train.csv/KE Grassland_Test.csv, please review Sections 4.1.5 and 5.1 of the ATBDv1.3, in particular Fig 10. As noted there, in order to obtain proper generalizable results, the soil carbon data, which is often skewed towards smaller carbon values, must be rebalanced in the training data set (but not in the testing dataset) before the model is built, to avoid overfitting to smaller carbon values. During this process, the number of samples in the training data set changes, and often goes up as more synthetic samples are added to higher soil carbon ranges, as noted in those sections. However, the test set is separated out from the original dataset before this procedure is carried out, so it remains fully representative of the original dataset. The reason why the test set comes out to ~60 is that the test ratio used is 10% and 10% of 616 is approximately 60. The remaining 90% of data have undergone the rebalancing to form the training dataset.
Documentation provided by project participant

[6] http://landscapeportal.org/blog/2015/03/25/the-land-degradation-surveillance-framework-ldsf/

[7] Vågen, Tor-Gunnar; Winowiecki, Leigh Ann; Desta, Luseged; Tondoh, Jerome; Weullow, Elvis; Shepherd, Keith; Sila, Andrew; Dunham, Sarah J.; Hernández-Allica, Javier; Carter, Joanna; McGrath, Steve P, 2021, "Wet chemistry data for a subset of AfSIS: Phase I archived soil samples", https://doi.org/10.34725/DVN/66BFOB, World Agroforestry (ICRAF), V1, UNF:6:15bkgMxXho9IjXVQ0SI0Sw== [fileUNF]

ATBD document v1.3
DOE assessment **Date :** 21/11/2023
Noted. Notably, none of the current samples fall within the project activity area. Plans are in place to conduct soil sampling within the project activity area before the first verification. Despite the availability of global datasets from previous years enabling model creation and future predictions, it's highlighted that the model's predictions can be tested on future dates during verification. Moreover, the potential recalibration of the model is acknowledged. PP has utilized the International Council for Research in Agroforestry (ICRAF), a CGIAR lab, as the trusted database for validation, as outlined in ATBD V1.3. For these considerations, FAR#01 is raised for the verification stage, outlining these steps and considerations for future model testing and potential recalibration. PP is requested to provide "Kenya_ICARF_Idsf_AFSIS_calibration_dataset.csv" for model training.
Project participant response **Date :** 22/11/2023
Noted. Kenya_ICARF_Idsf_AFSIS_calibration_dataset.csv is provided in 'Supplementary Data for ATBD' folder
Documentation provided by project participant
DOE assessment **Date :** 22/11/2023
Noted. Kenya_ICARF_Idsf_AFSIS_calibration_dataset.csv is assed. Input to model seems okay however, ground samples from project activity area are required which will be tested at the verification stage. This pointer is added to FAR#01. Therefore, CL#13 is closed.

CL ID	16	**Section no.**		**Date :** 06/10/2023
Description of CL				
In Section 3.1.3 of "Carbon Focus Version 1.1," it appears that there is a gap in the document where it does not mention the specific soil carbon ranges, or the data cleaning procedure related to soil carbon data. This is a significant omission, as understanding the range of soil carbon values and the steps taken to clean and preprocess the data are crucial for transparency and reproducibility in scientific research. PP is requested to provide more details for assessment purpose.				
Project participant response				**Date :** 26/10/2023
Please refer to Section 5.1 of the ATBD, which details not only the cleaning procedures but also any numbers of points removed due to the cleaning.				
Documentation provided by project participant				
ATBD document v1.3				
DOE assessment				**Date:** 17/11/2023
In the current version, v1.2, of the ATBD document, Section 5 serves as the conclusion. PP is requested to provide details for assessment.				



5 Conclusions

This document presents Boomitra's Soil Organic Carbon stock measurement methodologies and demonstrates their calibration, validation and inference processes. A machine learning system inspired and built on first-principle physics is demonstrated and its efficacy is shown for soil carbon calculation in multiple regional geographies. Synthetic aperture radar, in conjunction with visible and infrared satellites, is shown to be effective in sensing soil organic carbon at depth, meeting the requirements of 3rd party soil carbon credit methodologies.

Furthermore, the entire process for training, validating and utilizing models for given regions is presented, along with supplementary scripts for each step. These steps and documentation collectively provide the reader with the ability to fully replicate analyses. The analyses are also compared to gold standard soil sampling and lab testing approaches, with the resultant uncertainties of each method compared.

Project participant response	**Date :** 20/11/2023
Assessment has been provided in the latest ATBD document.	
Documentation provided by project participant	
DOE assessment	**Date :** 22/11/2023
PP has provided the details of soil carbon ranges and data cleaning procedure. This finding is closed now.	

CL ID	17	**Section no.**		**Date :** 06/10/2023
Description of CL				
In Section 3.1.4 of the ATBD document, "Mining Satellite Data," it appears that there is ambiguity regarding whether Sentinel-1 data is used for the project. To clarify this matter, it is recommended that PP explicitly states whether Sentinel-1 data is utilized in the research. If Sentinel-1 data is indeed used in the project, it would be beneficial to provide additional details regarding the data preprocessing steps, such as band cross-calibration and temporal smoothing functions, if applicable. This information would help readers understand how the satellite data was prepared and processed for use in the analysis, contributing to transparency and reproducibility.				
Project participant response				**Date :** 26/10/2023

In this work, Sentinel-1 data is not used in the training dataset, hence it is not mentioned in the 'mining satellite data' section that is related to the mining of data to form the training dataset. It is used later during subsequent predictions to enhance temporal resolution due to Sentinel-1's higher revisit frequency than other SAR satellites. When Sentinel-1 is used, the corresponding level 1c satellite products from the ESA for the specific date and time are first downloaded, then they undergo a geocoding correction by using an 'orbit file' that describes the orbit of the satellite while the imaging happened, followed by thermal noise reduction, radiometric calibration, terrain flattening and terrain correction. These are all standard radar processing techniques for Sentinel-1, that are done with the ESA's default 'SNAP' library. It is also outlined in this conference proceedings paper (https://sciforum.net/manuscripts/6201/manuscript.pdf) and (https://github.com/ffilipponi/Sentinel-1_GRD_preprocessing)

These processes are carried out during the prediction process itself, on-the-fly, and can be found in the 'tiered_carbon_lambda.py' code, starting from the line that says "if "S1" in satellite_ls:".

Documentation provided by project participant

tiered_carbon_lambda.py

DOE assessment	**Date:** 17/11/2023

Please substantiate the predictive values derived from ALOS PALSAR and Sentinel-1 by showcasing their performance over time series or through simultaneous satellite observations. As different satellites are utilized for model training and prediction, it's crucial to demonstrate the consistency and reliability of these predictions. Kindly include this detailed explanation explicitly in the ATBD document for clarity and validation purposes.

Project participant response	**Date :** 20/11/2023

The explanation is explicitly included in ATBDv1.3 in Section 4.2.1 and Fig 7, which is a graph of simultaneous satellite observations. We find that 10% or lesser errors across the range for a spatiotemporal fusion model are indeed achievable. The root mean squared error of the HH band prediction on testing is 0.0186, whereas the range in HH in the dataset is 0.2245 (note that 0.0186/0.2245 = 8.285% < 10%). Similarly for HV, the testing RMSE is 0.005862 and the range 0.05550 (0.005862/0.05550 = 10.5% ~ 10%). For the raw data of Fig 7, please refer to hh_data_test_obs_pred.csv, hh_data_train_obs_pred.csv, hv_data_test_obs_pred.csv, hv_data_train_obs_pred.csv.

Documentation provided by project participant

ATBD document v1.3

DOE assessment	**Date :** 21/11/2023

PP has not provided the following datasets: hh_data_test_obs_pred.csv, hh_data_train_obs_pred.csv, hv_data_test_obs_pred.csv, and hv_data_train_obs_pred.csv, as per their response.

Additionally, there's ambiguity regarding the reduction or deduction of the calculated RMSE score for the HH and HV datasets concerning the interconverted propagation to model prediction. Clarification is sought on the methodology or process employed to achieve the reduction or deduction in the RMSE scores for these datasets in relation to their influence on model predictions.

Project participant response	**Date :** 22/11/2023

Files are provided in 'Supplementary data for ATBD' folder

Firstly, RMSE on the interconversion model is minimize through the proper selection of hyperparameters. Secondly, this RMSE does contribute to the uncertainty in the final SOC model prediction results. This uncertainty cannot simply be calculated by adding up the RMSEs of the individual models. It must instead be calculated through either comparison of the combined system in predictions against conventionally sampled validation datasets, or otherwise through Bayesian monte carlo methods, incorporating simulations of the interconversion model as well in the Monte Carlo process. These approaches are described in Section 4.2.4 of ATBD.
Documentation provided by project participant
Supplementary data for ATBD' folder
DOE assessment **Date :** 22/11/2023
Supplementary data for ATBD' folder was assessed. The required files are also provided. Please note that the RMSE reduction here means that the difference in values between the sensor observation over the same lat long is due for error propagation that need to be reduced. However, this shall be done at the time of verification for which FAR#01 is raised and CL#17 is closed.

CL ID	18	**Section no.**		**Date :** 06/10/2023
Description of CL				
In the ATBD (Algorithm Theoretical Basis Document) document, it's important to include information about various machine learning (ML) operations performed, including data sampling strategy, data cleaning, feature identification, feature scaling, and hyperparameter tuning. These operations are critical to understanding the data preprocessing and model development process. Providing this information along with model log details enhances accuracy of the assessment and GHG estimates. Additionally, it's important to include error metrics, such as the training and testing R-squared (R2) scores, bias and pbias. R2 scores provide insights into the model's performance and its ability to explain variance in the data. Including these scores allows readers to assess the model's predictive accuracy.				
Project participant response				**Date :** 26/10/2023
Information on the data sampling strategy, data cleaning, and feature scaling specific to this project are provided in Section 5.1. Feature identification/feature selection/feature engineering is not used. All bands available from the satellites used are fed directly into the ML model. Hyperparameter tuning is done by brute force. The model training itself is detailed in kenya_grassland_trainer.py. Error metrics are added in the revised ATBD in Table 3.				
Documentation provided by project participant				
Kenya_grassland_trainer.py				
DOE assessment				**Date:** 17/11/2023

In the current version, v1.2, of the ATBD document, Section 5 serves as the conclusion. PP is requested to provide details for assessment. Model for “Kenya_grassland_trainer.py” python file is not provided. PP is requested to provide the model for further assessment.
Project participant response **Date :** 20/11/2023
Please see revised ATBDv1.3 and kenya_grassland_trainer.py in the supplementary materials folder that is specific to the kenya grassland project
Documentation provided by project participant
DOE assessment **Date :** 21/11/2023
The modeling approach has been deemed satisfactory following clarification. Subsequently, the ATBD has been revised, and the latest version is V1.3. However, it's noted that the model was not provided for testing the data, which is an outstanding matter to be addressed for validating the error scores. PP is requested to provide the model for review and validity of the details provided.
Project participant response **Date :** 22/11/2023
The model file is now provided in the ‘Supplementary data for ATBD’ folder. It is called ‘Kenya_grassland_model.mdl’. It may be opened with a joblib.load() command, which will expand it into an sklearn object. Calling predict on the object will allow predictions to be made – but input data should follow the same exact ordering as in the columns present in KE_Grassland_Train with the exception of the last SOC column, which is not sent to the model during prediction.
Documentation provided by project participant
DOE assessment **Date :** 22/11/2023
Noted. The model was testing run at VVB side to check the prediction score independently. The test score found to be correct as mentioned in ATBD V1.3. Therefore CL#18 is considered being closed.

CL ID	19	**Section no.**		**Date :** 06/10/2023
Description of CL				
The absence of quantitative and technical details related to the S1-PALSAR interconversion algorithm in the document is a limitation in terms of transparency and reproducibility. To address this issue and provide a more comprehensive understanding of the algorithm, PP is requested to provide Spatio-Temporal Fusion Model details, Number of Images Used, Error Metrics, interconverted data validated or assessed against ground truth data or independent sources to evaluate the accuracy of the algorithm.				
Project participant response				**Date :** 26/10/2023

The Section 4.2.1 of the ATBD has been updated with further details on the specific code used, the accuracy of the algorithm, figures, error metrics, testing against validation data etc.
Documentation provided by project participant
DOE assessment | **Date:** 20/11/2023
Section 4.2.1 of the ATBD V1.3 is revised based on the clarification requested, however the code for review was not provided. PP is requested to provide the code for review.
Project participant response | **Date :** 21/11/2023
Sentinel1_alos_generator.py is now provided in 'Supplementary data for ATBD' folder. Mined data of matching sentinel-1 & alos tiles is in 'full clean s1 palsar datain'. Final observations and predictions can be seen in hh_data_test_obs_pred.csv hh_data_train_obs_pred.csv hv_data_test_obs_pred.csv hv_data_train_obs_pred.csv
Documentation provided by project participant
DOE assessment | **Date :** 22/11/2023
Noted. The data & files were assessed, and the results were found satisfactory.

CL ID	20	**Section no.**		**Date :** 06/10/2023
Description of CL				
In Table 2 of the document, titled "Satellite Data Used in Kenya Grassland Soil-Specific Models Training," it is important to explicitly mention whether Sentinel-1 interconverted data was used in the modeling process. This addition will help readers understand the full scope of satellite data employed for model training and provide a clear picture of the data sources involved in the study. Furthermore, PP is requested to provide clarification how uncertainties and errors associated with different satellite data sources, which have varying spatial and temporal resolutions, were managed and propagated throughout the modeling process. Additionally, it should specify whether spatial resampling operations were conducted and provide details on the methods used.				
Project participant response | **Date :** 20/11/2023				
Sentinel-1 interconverted data is not used in the model training process (aka the 'modeling process'), hence it is not included in Table 2. During training, the calibration dataset, as mentioned in the document Section 5.1, is collated by using a +/-0.0006 degree box in latitude and longitude around each specific sample location and averaging the pixels found within that box. This ensures that the spatial resolutions are all standardized in the training. Temporal resolutions are managed by using the closest cloud-free visible/infrared data to a given SAR observation, as mentioned in Section 5.1. The above ground biomass signatures picked up by the visible and infrared data chance relatively slowly				

over days and are typically a lagging indicator of the soil conditions that are directly picked up by the SAR data [1], hence using the closest cloud-free visible/infrared data is a reasonable strategy.

During using the model for subsequent predictions, bilinear spatial resampling has been used, as seen in the resize function used in tiered_carbon_lambda.py during prediction. Again, the closest cloud-free visible/infrared data to the SAR data is used during prediction as well.

The machine learning models themselves are nonlinear models, and the noises due to the satellite data are random errors from satellite instruments, which are as discussed in Table 3. For this reason, the proper propagation of these input errors is directly absorbed into the frequentist and Bayesian error calculation methods presented from Section 5.1.1. In the frequentist case, the comparison of the satellite predictions to a ground truth validation dataset automatically allows for the incorporation of satellite input errors as these are carried over to the determined Mean Squared Error. In the Bayesian case, the satellite input errors become incorporated through the changes in the model predictions in each simulation of the model training and are thus contained in the Predictive Posterior Distribution (PPD) for each average soil carbon level of a given farm.

[1] https://journals.ametsoc.org/view/journals/hydr/3/4/1525-7541_2002_003_0395_rbsmas_2_0_co_2.xml

Documentation provided by project participant

tiered_carbon_lambda.py

DOE assessment	**Date:** 21/11/2023

During the assessment of the files post demo it was observed that there are issues in prediction when there is large difference in days of observation of two satellites i.e. temporal alignment issue. The approach however seems to be satisfactory.

The tiered_carbon_lambda.py file was not provided for review.

Project participant response	**Date:** 22/11/2023

Tiered carbon lambda is now provided in the ‘supplementary materials for atbd’ folder. Resize_image can be seen used in line 485. Resize_image is defined in helper.py

Documentation provided by project participant

DOE assessment	**Date:** 22/11/2023

The temporal alignment still remains modeling error at the validation stage. Given that satellite data alignment remains a challenge in remote sensing world. For this issue to be checked, Issue is added to FAR#01.

CL ID	21	**Section no.**		**Date :** 06/10/2023

Description of CL

The inconsistency between Table 2 and Table 3 regarding the inclusion of ALOS-2 uncertainties in the CarbonFocus ATBD document is a discrepancy that should be addressed for clarity and completeness. PP should update Table 3 to include the uncertainties associated with the ALOS-2 data source, matching the information provided in Table 2 or provide clarification for exclusion.
Project participant response **Date :** 26/10/2023
Table 2 concerns satellite data used during training of the Kenya grassland-specific model, whereas Table 3 concerns specific raw input data used during prediction (post-training) of the Kenya-grassland model. As presented in Section 4.2.1, Sentinel-1 has a higher temporal resolution than ALOS-2, while being correlated to it, but ALOS-2 is believed to have stronger correlation to individual soil samples. Hence, ALOS-2 is used during training the kenya grassland-specific machine learning, while Sentinel-1 is used during prediction to produce high spatial and temporal resolution graphs for each farm like that in Figure 15, which allow for a stronger final measurement power and lower uncertainty. The interconversion between Sentinel-1 and ALOS-2 is discussed further in the other preceding CLs.
Documentation provided by project participant
DOE assessment **Date:** 17/11/2023
Noted. Table 2 of ATBD V1.2 pertains to the satellite used for model training and table 3 deals with the post model training i.e. prediction uncertainites due to input. PP is requested to clarify and include details in the document about how the uncertainties associated with model training inputs are calculated. Please note that CL#21 will be addressed subsequent to the closure of CL#17.
Project participant response **Date :** 20/11/2023
Uncertainties associated with the model training inputs are directly collected from the data source documentations of the corresponding inputs. However, ultimately, the uncertainty on the *outputs* is judged on either (1) direct comparison of outputs to ground truth soil samples; or (2) a Bayesian analysis involving Monte Carlo simulations that simulation the full distribution of the outputs given the different uncertainties that occur in the process. Both of these approaches endeavor to capture the full uncertainty of every step leading to the output carbon levels.
Documentation provided by project participant
DOE assessment **Date :** 21/11/2023
Verification will involve direct comparisons with ground data for the current modeling approach and for this please refer to FAR#01. While the testing data results from train & test data are deemed satisfactory for validation, the temporal scale remains unconfirmed. To clarify, the input errors resulting from discrepancies due to the interconverted data algorithm remain unaddressed, causing propagation issues. PP is kindly requested to substantiate this by providing SOC prediction values alongside Sentinel-1 data & ALOS-2 for the monitoring period dates. For further details refer to CL#17.

Bayesian analysis, employing Monte Carlo simulation, effectively captures post-prediction errors. However, input error assessment relies on the sampling plan implemented during training data collection, scheduled for verification.

CL ID	22	Section no.		Date : 06/10/2023
Description of CL				
There exists a notable inconsistency among the project area figures reported in different sections of th e document, including 211,828 hectares on Page 93 of the PD, 23,439 hectares on Page 71 of the PD , and the KML assessment's 9,257 hectares (equivalent to 22,876 acres). PP is requested to provide cl arification regarding this discrepancy, and if the KML assessment is deemed accurate, the document s hould be updated to reflect the correct project area. Additionally, there is ambiguity concerning whether the GHG reductions are calculated based on the ar ea at the time of validation or if they account for projected future expansion of the project area. Clarific ation on this matter is necessary for a complete understanding of the GHG reduction calculations.				
Project participant response				**Date :** 20/11/2023
Non eligible areas in KML has been removed and new calculated areas has been updated in the revise d PD and excel sheet.				
Documentation provided by project participant				
Revised PD and ER excel sheet.				
DOE assessment				**Date:** 22/11/2023
CL#22 is closed based on CAR#11(site visit observation). The area in PD is now consistent with KML area.				

CL ID	23	Section no.	4.4.3	Date : 17/10/2023
Description of CL				
Estimated baseline emissions or removals (tCO_2e) in section 4.4.3 of the PD does not match with provided Excel sheet (Kenya Grassland Project CTR) In ER sheet From Baseline ER reductions (tCO2e) row from Cell $I4 to $I23. PP is requested to clarify it.				
Project participant response				**Date :** 20/11/2023
The ER excel sheet and PD has been updated with proper number and consistency between the documents has been maintained.				
Documentation provided by project participant				
ER sheet.				
DOE assessment				**Date:** 21/11/2023
PP has updated the ER calculation sheet and CL#23 is closed.				

CL ID	24	Section no.	2.4	Date : 01/09/2023
Description of CL				
Comment 1 This morning I was alerted to the listing of Project no 3340 (BOOMITRA GRASSLAND RESTORATION IN EAST AFRICA THROUGH SOIL ENRICHMENT) on the Verra registry. Looking at the submitted KML file, the intended project includes Laikipia Country, which therefore includes all LCA member landscapes. Although we have had a few introductory conversations with the proponent parties, EarthAcre and Boomitra, at no point has the LCA nor its constituent members consented to this project or entered into any agreements that would suggest otherwise. Please provide clarification for the above public comment.				
Project participant response				**Date :** 20/11/2023
LCA members has been contacted and described our intention to include them in the project. Still the discussion are ongoing.				
Documentation provided by project participant				
Email Copies has been provided				
DOE assessment				**Date:** 21/11/2023
The issued raised during the public hearing period, the findings are still open.				
Project participant response				**Date :** 22/11/2023
Discussions with LCA members are ongoing, and mail copies have been shared. After finalizing talks, if they agree then an agreement will be established, inviting their participation in the project. Progress with the LCA conservancy will proceed upon their consent for the project only. Otherwise at the time of first verification the areas will be freezed as per VCS standard requirement without this land. At the time of validation LCA member areas are not included in instance1. However, as mentioned earlier at the time of first verification the areas will be freeze as per VCS standard requirement without this land				
Documentation provided by project participant				
DOE assessment				**Date :** 22/11/2023
As the discussion is going on between LCA members and planning to include LCA as project participant. At the time validation, LCA area was not included in the project area and will freeze this area at the time verification. Therefore, FAR#02 has been initiated by the audit team.				

CL ID	25	Section no.	2.4	Date : 01/09/2023

Description of CL
Comment 2 The Maasai Mara Wildlife Conservancies Association (MMWCA) is a membership organisation of the Mara conservancies, with a current membership of 22 Conservancies whose land is part of or integral to the Greater Maasai Mara ecosystem. Additionally, we are a member of the Kenya Wildlife Conservancies Association, contributing to the growth and development of conservancies nationally. Our Conservancies are based on a partnership between the Landowners and Tourism Partners, with MMWCA playing the coordination role. In this regard, we, among other things, work to create a common and unified front for landowners, communities and tourist partners to strengthen conservancies and create a large-scale impact in the greater Mara Ecosystem. We note that Boomitra seeks to implement a general, high-level grasslands restoration project in Southern Kenya, including Narok County. We wish to inform Verra that MMWCA, its member conservancies and relevant stakeholders in the Greater Mara Ecosystem are collaborating to implement sustainable grasslands management in the landscape. In this regard, we will seek carbon finance to support climate change mitigation goals under the "One Mara Carbon Project". As we prepare to seek the VCS listing, we note that our identified project area falls within the boundaries of the Boomitra project. Therefore, given that we have secured conservancies stakeholders' support in our area for our vision, we wonder if the Boomitra project may interfere with our ability to establish a successful, separate project for our land in the future. Please provide clarification for the above public comment.

Project participant response	Date : 25/10/2023
After discussing with the MMWCA, we have resolved the issue. Still the discussion is ongoing.	
Documentation provided by project participant	
Email Copy	
DOE assessment	**Date:** 17/11/2023
The issued raised during the public hearing period, the findings are still open.	
Project participant response	**Date :**20/11/2023
The public comments have been mentioned in the PD (please refer section 2.1.5). Conversations with organizations are ongoing both verbally and via email. This process is ongoing, and updates will follow upon conclusion. Consent from ranchers/pastoralists will be obtained, and official agreements will be signed if they choose to participate in the project. Otherwise at the time of first verification the areas will be freeze as per VCS standard requirement without this land.	
Documentation provided by project participant	
DOE assessment	**Date:** 21/11/2023
As the conversations with organizations are going on and issue is not yet completely solved, the finding is still open.	

Project participant response	Date : 22/11/2023
At the time of validation MMWCA areas are not included in instance1. However, as mentioned earlier at the time of first verification the areas will be freeze as per VCS standard requirement without this land.	
DOE assessment	Date: 22/11/2023
The issues raised by the MMWCA are not yet resolved till the validation, but discussion is going on between MMWCA members to resolve the issues. Also, PP has mentioned that planning is going on to include MMWCA as project participant and at the time validation, MMWCA area was not included in the project area and will freeze this area at the time verification. Therefore, FAR#02 has been initiated by the audit team.	

CL ID	26	Section no.		Date : 17/11/2023
Description of CL				
During the site visit, the audit team noticed that there were a few patches of woody vegetation within the ranches where project activities are going on. According to the PD, project activities are being implemented in the Savanna grasslands of East Africa to increase SOC. Looking at woody vegetation cover within the PA (see annexure I), it is not clear what percentage of wood/tree cover are considered to define the Savana grasslands. Therefore, PP is requested to provide the well accepted definition of the Savanna grasslands with suitable reference.				
Project participant response				Date : 20/11/2023
Definition of Savanna Grasslands: The **Savanna biome** is characterized by an extensive cover of grasses with scattered trees. It is a transitional biome between those dominated by woody vegetation (example: forest) and those dominated by grasses.				
Documentation provided by project participant				
Reference: LibreTextsGeosciences				
DOE assessment				Date: 21/11/2023
PP is requested to confirm whether the project is adhering to the Verra Program Definition or if it is following the specific national definition of grassland in Kenya? If the national definition is being utilized, would it be possible for PP to provide the precise definition for grassland as recognized by Kenya? This clarification is essential for ensuring alignment with the appropriate guidelines and definitions in the project's context. Please refer the Verra Program Definition V4.4. of grassland. As per this program's definition, grasslands encompass areas primarily dominated by grasses, where the tree density is insufficient to				

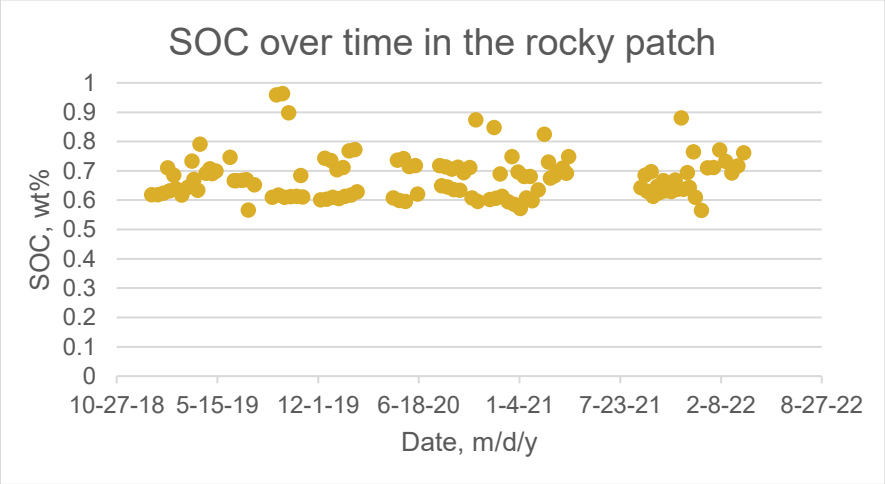
meet the internationally accepted criteria for forest classification. This definition encompasses savannas (grasslands with scattered trees) and extends to managed rangelands, pasturelands primarily used for grazing, and grass-dominated systems managed for conservation or recreational purposes.
Project participant response **Date :** 22/11/2028
As per the VCS Program Definition V4.4, Grasslands are areas dominated by grasses with a density of trees too low to meet an internationally accepted definition of forest, including savannas (i.e., grasslands with scattered trees). Grasslands also include managed rangeland and pastureland that is not considered cropland where the primary land use is grazing, and which may also include grass-dominated systems managed for conservation or recreational purposes. This project refers to this definition. As you may have observed during the field audit, the woody vegetation cover is very scattered in the project area. Alongside the water bodies, the intensity of woody vegetation is rather more than usual because of the availability of water. However, considering the Kasanga ranch is well protected, hence woody vegetation coverage is observed in the area. The predominant grasses are also available for livestock for grazing. As you can the references (Mesobrowser Abundance and Effects on Woody Plants in Savannas (usda.gov) and Grassland and Livestock Production: The East African Case (uky.edu)), woody vegetation is part of Savanna grassland in the Kenya region. However, further actions taken to remove noneligible areas and KML has been revised.
Documentation provided by project participant
DOE assessment **Date :** 22/11/2023
Noted. PP follows VCS Program Definition V4.4 for grassland definition. Considering the topograpgy and delineation done by PP in CAR#11 PP response dated 27 November 2023, the area is dlelineated to its maximum. However, the differential rate of change of SOC need to be assessed saperately for Kasanga ranch for which FAR#02 is raised. With this response from PP and FAR#02, CL#26 is considered as closed.

CL ID	27	**Section no.**		**Date :** 17/11/2023
Description of CL				
The audit team also noticed a few rocky patches (annexure-II) with PA. Soil particles are rarely seen on such rocky patches. Therefore, PP is requested to explain, how SOC is estimated on these rocky beds up to 30 cm depth.				
Project participant response				**Date :** 20/11/2023
Rocky areas were mostly identified in Kasanga ranch. We identified one such rocky area that spanned multiple acres (4.47 acres, the largest contiguous rocky patch that could be found, with all				

others <1 acre) to get an accurate calculation of soil carbon change as measured by our remote sensing that occurs over the course of a few years.

The location of the site is 1°27'10.89" S, 37°03'11.10" E.

When the SOC was studied with remote sensing over time, the following data was produced.



As seen in the above, the soil data does not show a discernable increase or decrease for this area. Furthermore, the same carbon credit quantification script used for the project scenario has been used on this data, and it is found that the measured carbon change is -0.001wt% per year (likely within the noise regime for a measurement of no change in soil carbon), which is very small relative to the 0.0342wt% increase observed on the overall Kasanga ranch yearly. Given that Kasanga is across 3739.91 acres and this largest rocky patch in Kasanga is 4.47 acres, the final effect of the rocky patch on the SOC wt% increase calculated for Kasanga ranch is -0.001wt%*4.47 acres/3739.91 acres = -0.00000119 wt%, which will not be perceptible in the final ER calculations, and is far below both the

total uncertainty in the overall calculation and the materiality thresholds by several orders of magnitude.

Documentation provided by project participant

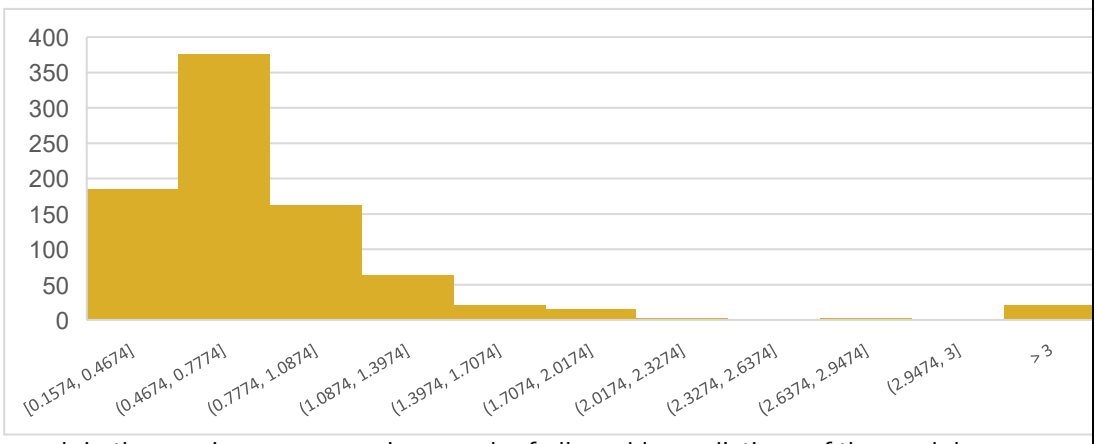
DOE assessment	**Date:** 21/11/2023

1. Requesting clarification from PP regarding the observed SOC value of 0.7 wt% in the rocky patch figure. Considering the project's established SOC range for grassland (0-2 wt% for min & max), this value appears notably high for rocky features. Clarification is sought specifically on the SOC values, as this discrepancy might potentially lead to overestimations of ER in other soil areas, especially considering the high RMSE value of 0.25 wt% & some prediction values over the rock feature. Please note that the clarification is for the SOC values itself and not the change in carbon that is -0.001 wt%

   18)
2. Furthermore a few spikes over the during the monitoring period raise concern over the data cleaning procedures. PP is requested to provide clarification on this aspect.

Project participant response	**Date:** 22/11/2023

1. The model is not trained on rocky areas, as all soil samples used to train the model are by definition taken from areas with soil. The model is a tree-based ensemble model. As a result it is most likely to give a prediction of its average value when it tries to predict for a condition it was not trained for (Eg. Rocky soil). 0.7wt% is roughly the average of the SOC distribution found in the raw calibration dataset:



   19)
2. The graph in the previous response is a graph of all weekly predictions of the model throughout the monitoring period. In practice, as previously noted, only data from January and February are used for ER computation. If you look at the graph closely, you may observe the major spikes come from time periods outside of January and February, particularly the time periods of the rainy seasons in Kenya. The results, as stated previously, are much more noisy during rainy seasons for a multitude of reasons and as a result the ER calculations avoid using such times of the year.

   20)

Documentation provided by project participant

DOE assessment	**Date:** 22/11/2023

Acknowledged. When a model lacks training for specific classes or sample data, it typically predicts an average value. However, for ER calculations, rocky patches that do not influence SOC change need to be delineated and excluded from ER calculations. Requesting PP to adhere to stringent QA/QC procedures during verification. Upon further assessment of PP's response and data, it's observed that there's noise during the rainy season in Kenya, which is not considered in the ER calculation assessment. Hence, CL#27 is closed.

CL ID	28	**Section no.**		**Date :** 17/11/2023
Description of CL				
The implementing partners and ranch owners mentioned that the ranches were divided into many blocks/zones based on the carrying capacity of the grasslands. For sustainable management of the grasslands, determination of carrying capacity of grassland is very important. Although, managers of Leukenya ranch tried to explain the carrying capacity of the grassland, but hardly they can explain the scientific explanation. Therefore, the PP is requested to clarify, how and what are the parameters are used to determine the carrying capacity of the grasslands during designing the grazing model.				
Project participant response				**Date :** 2/11/2023
The carrying capacity of the ranchers depend on the following parameters, Forage availability by type and abundance, Range conditions and vegetation, Precipitation and climatic patterns, Soil fertility, texture and moisture holding capacity, Livestock breeds and types, Abundance of wildlife and other herbivores. Please refer CL ID 03 for the calculation.				
Documentation provided by project participant				
NA				
DOE assessment				**Date:** 21/11/2023
PP has satisfactorily explained the grassland carrying capacity determination procedure in the project and the CL#28 is closed.				

CL ID	29	**Section no.**		**Date :** 17/11/2023
Description of CL				
The ranches are divided into blocks/zones based on the carrying capacity of the grassland. PP is requested to clarify if the grazing activities as per the monitoring plan/ grazing model is monitored using remote sensing?				

Project participant response	Date : 20/11/2023
Remote sensing could be used to monitor vegetation levels, and thus grazing activities for checking a degree of conformance to the monitoring plan. However, due to a lack of ground truth data for grazing activity monitoring, plus the fact that grazing detection with remote sensing has not yet been shown to be accurate in peer-reviewed literature, we have not included grazing activity monitoring with remote sensing as a key activity in the monitoring plan. Monitoring reports may feature satellite vegetation analysis to complement the reports of activities monitored from the ground but cannot replace the reports from the ground as the main source of the truth. Implementation partners and the ranchers will continually monitor their grazing activities through the maintenance of rancher diaries, as noted in the PD monitoring plan.	
Documentation provided by project participant	
NA	
DOE assessment	**Date:** 21/11/2023
Noted that the remote sensing technology is not used for monitoring the grazing activities at the blocks and zone level. PP heavily relies on the implementing partner for the ground report as per the monitoring plan outlined in the project document. Thus CL#29 is closed.	

CL ID	30	Section no.		Date : 17/11/2023
Description of CL				
PP is requested clarify whether there has been any validation using physical ground samples post model training to assess the model's reliability and accuracy, either currently or historically (Post 2019). Acknowledging that this might extend beyond the present monitoring period, this validation is crucial for evaluating the model's performance and reliability.				
Project participant response				**Date :** 20/11/2023
The testing dataset provided with the results in the ATBD is one such dataset that is used post-model training to assess the model's reliability. None of the testing dataset points have been used in connection with any training. Beyond this dataset, there is a plan to do a certain amount of conventional soil sampling, in conformance with the numerical requirements of Section 4.2.5 of the ATBDv1.3, stratified by each soil texture class found in the project activity area, to continually show the comparison between remote sensing and ground truth before every verification of the project.				
Documentation provided by project participant				
NA				
DOE assessment				**Date: 22**/11/2023
Acknowledged. PP commits to providing the RothC and remote sensing values during the verification process. Ground samples are not collected by PP during validation; instead, PP intends to conduct ground sampling independently during verification. As the project activity is retrospective, the model's prediction will align with the current date and time. In light of this, FAR#1 has been raised to address this procedure and CL#30 is considered closed.				

CL ID	31	Section no.		Date : 20/11/2023
Description of CL				
PP is requested to substantiate the estimated changes in Soil Organic Carbon (SOC) resulting from project activity interventions using the RothC model? Additionally, it would be valuable to compare these estimations with Remote Sensing-based predictions. This comparison aims to highlight potential discrepancies or agreements between the RothC model estimations and Remote Sensing predictions, considering any potential issues that might arise in terms of accuracy or consistency between these two methods.				
Project participant response				**Date :** 21/11/2023
Yes, at the time of first verification, PP planned to provide an analysis of the RothC and remote sensing values. PP has to collect soil samples within the project area and get the soil test results from the reputed lab within the country. Then the values are analyzed against remote sensing predictions. This analysis will be provided at the time of verification.				
Documentation provided by project participant				
NA				
DOE assessment				**Date:** 22/11/2023
It's acknowledged that there could be potential underestimation in the baseline scenario using RothC and potential accuracy or overestimation due to the advanced remote sensing technology-based model, potentially leading to an overestimation of ERR. To prevent estimation discrepancies arising from project interventions, calculations by the RothC model were requested. Verification of these discrepancies is crucial, and consequently, FAR#01 has been raised for verification purposes.				

CL ID	32	Section no.		Date : 17/11/2023
Description of CL				
PP is requested a detailed explanation, particularly focusing on the input measurements derived from remote sensing technology, as mentioned on page 91 of the PD V4.3. It's crucial to understand how these measurements are obtained, considering the known uncertainties associated with remote sensing technology.				
Project participant response				**Date :** 20/11/2023
The PD has been revised, and now there are no inputs derived from remote sensing mentioned in the table on p. 91. Originally, soil cover was stated as being detected remote sensing, but this was an editorial error. This project is in a native grassland region where the soil is covered by pasture vegetation year-round, so Soil Cover is always taken to be 100%. The vegetation is not tilled/harvested with equipment or removed in any such way as part of the project activities, so it remains. Other than the regular inputs to the model at each time step mentioned in p.91, the soil organic carbon determined by remote sensing at t=0 is used in the initialization of the RothC model. As discussed in the responses to CL 11 and 12, pixel level RMSE may be around 0.25wt% but the ranch level RMSE gets much lower when calculated from either a frequentist or Bayesian approach. The RothC model is run on the sample unit level, which in this project is each individual ranch.				
Documentation provided by project participant				

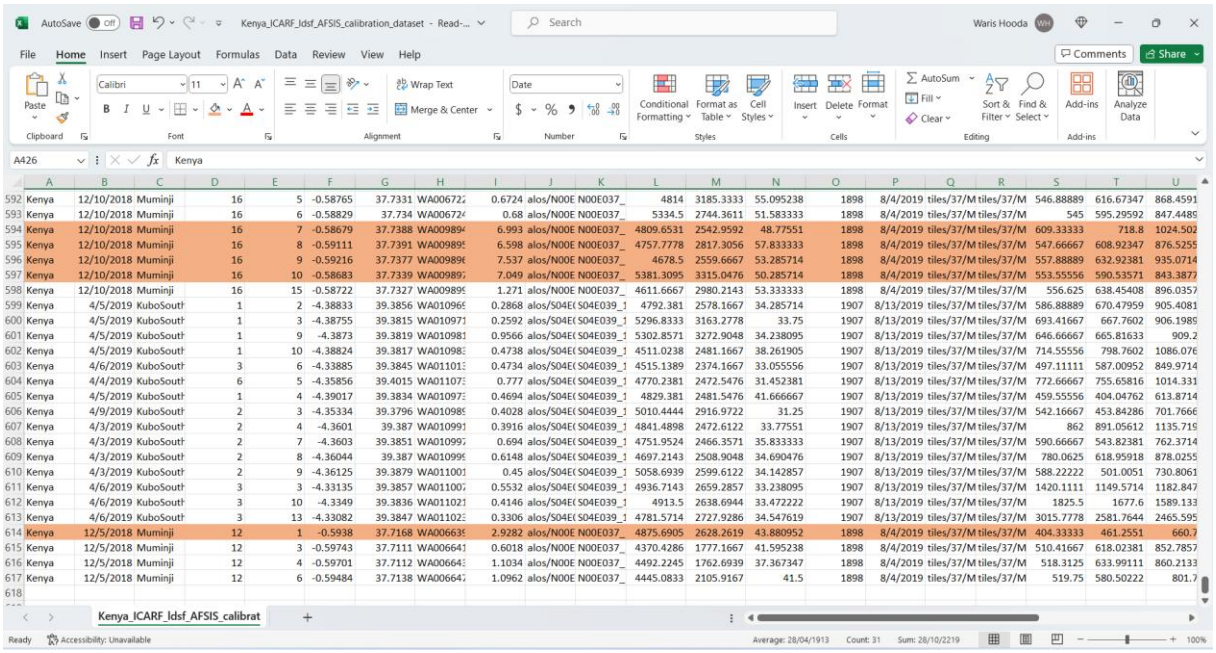
DOE assessment	**Date:** 21/11/2023
Noted the PD is revised based on the clarification requested. Therefore, CL#32 is closed.	

CL ID	33	**Section no.**		**Date :** 17/11/2023
Description of CL				
PP is requested to clarify whether the final Soil Organic Carbon (SOC) value is based on a specific breakdown date or if it represents an average of all dates within the monitoring period? Furthermore, PP is requested to provide demo for estimation SOC for each ranch.				
Project participant response				**Date :** 20/11/2023
The SOC value is not based on the average of all dates within the monitoring period. As mentioned in ATBD Section 5.1, prior to the start of 5.1.1, only the months of December, January and February are expected to be included in the averaging for the assessments. In particular, the first monitoring period uses January and February 2019 (for t=0), and January and February 2023 (for t=4). Demo estimation is provided in Results_KE_Grasslands_demo folder				
Documentation provided by project participant				
Results_KE_Grasslands_demo				
DOE assessment				**Date:** 21/11/2023
During the demo on November 23, 2023, the model was executed for the entire project area, and immediate results were shared. However, it's noted that for the initial monitoring period (t=0 to t=4), only January and February data are considered. Clarification is requested from PP regarding the modeling specifics outlined in the project documentation. It's unclear why data from other months was predicted if not used for averaging. Additionally, evidence is sought regarding the ground sample dates utilized for model training and testing. Requesting access to the raw files containing this information would enable confirmation of the specific ground sample dates employed.				
Project participant response				**Date:** 22/11/2023
Data from other months is predicted to demonstrate how monthly trends may look like from a visual perspective, and to demonstrate the power of the technology. Furthermore, farmers may receive the full trends for their own purposes to study the impacts of the practices they do. The other months are not necessary for the ERR prediction, and we can remove it from the demo folder if necessary. Please see the 2nd column in 'Kenya_ICARF_ldsf_AFSIS_calibration_dataset' for the ground sample dates				
Documentation provided by project participant				
DOE assessment				**Date:** 22/11/2023

ER calculations are based on January and February month of the monitoring period. Kenya_ICARF_Idsf_AFSIS_calibration_dataset' have the temporal details as required for modelling. Therefore, CL#33 is considered closed.

CL ID	34	**Section no.**		**Date :** 17/11/2023
Description of CL				
PP is requested to clarify the criteria for thresholding values for outlier detection specific to the project area. While there are values that are greater than 2 wt% in the Kenya_ICARF_Idsf_AFSIS_calibration_dataset.csv.				
Project participant response				**Date :** 20/11/2023
Firstly, samples were restricted to a soil carbon range from 0 to 5%, since there were not many samples greater than 5% (see Fig 3) and these are typically the ranges of SOC in temperate grasslands[8]. This process led to the removal of 9 samples (1.4%). Secondly, during the rebalancing phase (as referenced in Fig 10 in ATBD), the vast majority of samples were found to be under 1.5wt%, with just 7 values larger than 1.5wt%. However, doing a proper rebalancing for such a large range in soil carbon (1.5wt%-2wt%) requires much more than just 7 samples, so the data was further restricted to under 1.5wt%, removing the 7 samples (1.1% of total data). This last bit is now explicitly mentioned in the ATBD as well. Since the amount of data in the >1.5wt% range is very small relative to the total soil sampling dataset, which is itself a recent dataset collected in the past 6 years, it is expected that almost all soil carbon values on the project activity areas will be in the 0-1.5wt% range and the model, despite this level of thresholding, will be sufficiently representative of the scenarios in the project.				
Documentation provided by project participant				
DOE assessment				**Date:** 21/11/2023
Out of 617 samples in the calibration dataset of remote sensing data, if any exceed the outlier threshold, it could significantly impact the calibration process. A strict QA/QC procedure is crucial in modeling to address outliers, as they can distort statistical models, affecting prediction accuracy. Proper validation, error identification, and robust statistical methods are essential to mitigate their influence, ensuring accurate representation of the dataset in calibration results. In addition to this PP in ATBD V1.3 mentioned that data was further restricted to under 1.5wt%, removing the 7 samples (1.1% of total data) however these sample could be seen the data frame. PP is requested for clarification on this discrepancy. PP in CL#33 mentioned that only data from January and February are considered for this monitoring period. Clarification is sought regarding the inclusion of data from other months for calibration purposes. Understanding the rationale behind using data from months beyond the specified monitoring period would provide clarity regarding the calibration approach.				

[8] https://www.sciencedirect.com/science/article/pii/S0341816221004938



Project participant response	Date: 22/11/2023

The 1.5wt% limitation is carried out by grassland_data_rebalancer.py. Observe lines 19 and 64 in that code. This is the reason why Kenya_ICARF_ldsf_AFSIS_calibration_dataset has some higher points, but the final rebalanced file fed to the modeling – KE_grassland_train – does not. The max value in that file is 1.43wt%.

The calibration approach and scientific framework utilized in this work is very dependent on the understanding of soil properties. Soil properties, unlikely above ground biomass, change very slowly with time. Through pre-processing techniques like the rebalancing, and the inclusion of radar data, the model learns to pick up on these soil properties. Since soil carbon does not change significantly in its absolute value over time, it is beneficial to include as many soil samples from the recent past as possible during model training, regardless of the month the data is sourced from. The model is not picking up on above-ground signatures to extrapolate soil information. Rather, it is directly receiving soil information from the specific satellite mix that it uses. Providing a larger amount of training data allows the model to get better at predicting the full relevant SOC range. Restricting the training to only January and February would unnecessarily restrict the predictive power of the model, particularly when key data inputs like radar still provide soil information around the year. On the other hand, predictions to calculate ERs are restricted to January and February from a noise minimization perspective and to also align with the start of a new cropping season in Kenya when the activities leading to the ERRs generation can happen.

Documentation provided by project participant

DOE assessment	Date: 22/11/2023

Noted. The ER calculations solely consider values from January and February. As the spikes or outlier values fall outside of these two months, they are not utilized for calibration purposes. Consequently, CL#34 is closed.

Table 2 CAR Correction Action Required

CAR ID	01	**Section no.**	1.3	**Date :** 29/09/2023
Description of CAR				
1. *As per the VCS project description template, the summary description of the project should be limited to one page only. But the summary of the project in PD is more than one page. Therefore, PP is requested to limit the summary description of the project in one page.*				
Project participant response				**Date :** 25/10/2023
Now summary page description has been reduced to one page as per VCS template requirements.				
Documentation provided by project participant				
Revised PD.				
DOE assessment				**Date:** 17/11/2023
Summary section has been updated in the revised PD. Finding is closed.				

CAR ID	02	**Section no.**	1.3	**Date :** 29/09/2023
Description of CAR				
Section 1.3 of the PD does not clarify whether the project area includes any wetland or not. Also not mentioned if there was any change land use pattern within 10 years prior to project starting date. Therefore, PP is requested to update the PD incorporating this information.				
Project participant response				**Date :** 20/11/2023
LULC analysis using satellite data Latest has been used to verify this and LULC is provided for your reference. From the analysis it evident that none of the project polygons include wetlands land use category. And also we have checked the land records of the ranches and found that these ranches were grasslands 10 years prior to project starting date and will remain grasslands in future as well.				
Documentation provided by project participant				
NA				
DOE assessment				**Date:** 21/11/2023

MODIS Global LULC was checked for project activity area. Due to coarse resolution of the spatial data the previous satellite images were also crosschecked on visual inspection. A few observations which were made during the visual inspection of satellite imagery were further confirmed during the site visit. Please refer to CL#26 CL#27 and CAR#11

Project participant response	**Date :** 22/11/2023
As you may have observed during the field audit, the woody vegetation cover is very scattered in the project area. Alongside the water bodies, the intensity of woody vegetation is rather more than usual because of the availability of water. However, considering the Kasanga ranch is well protected, hence woody vegetation coverage is observed in the area. The predominant grasses are also available for livestock for grazing. However, all lands enrolled in this project are grasslands. However KML has been updated with eligible areas.	
Documentation provided by project participant	
DOE assessment	**Date:** 22/11/2023
Noted the KML is revised based on CAR#11. Therefor CAR#02 is closed.	

CAR ID	03	**Section no.**	1.4	**Date :** 29/09/2023
Description of CAR				
Section 1.4 of the PD does not include a clear description of the location, project area, projection boundary, etc of the first project instance (PI). Therefore, PP is requested to update this section of the PD incorporating the missing information. PP is also requested highlighted very briefly about the targeted project activity in this PI.				
Project participant response				**Date :** 25/10/2023
PD has been updated with new image in section 1.4.				
Documentation provided by project participant				
Revised PD				
DOE assessment				**Date:** 17/11/2023
PP has updated this section and the finding is closed now.				

CAR ID	04	**Section no.**	2.3	**Date :** 29/09/2023
Description of CAR				
Section 2.3 of the PD does not mention whether the implementing project activities will promote suitable environmental conditions for invasive species or not. PP is requested to update this section with suitable justification related to invasive/non-native species establishment in the PA.				
Project participant response				**Date :** 20/11/2023

In this project no invasive species are promoted. This has been updated in the revised PD.
Documentation provided by project participant
Revised PD
DOE assessment | **Date:** 21/11/2023
PP has clarified satisfactorily and the closed this finding.

CAR ID	05	**Section no.**	2.4	**Date :** 29/09/2023
Description of CAR				
Section 2.4 of the PD referred to two public comments (from Laikipia Conservancies Association and Maasai Mara Wildlife Conservancies Association) related to project boundary and land ownership. But not mentioned how these issues have been resolved. Therefore, PP is requested to update this section clearly mentioning the public comments and measures that resolved the issues with suitable evidence.				
Project participant response | **Date :** 20/11/2023				
Updated the section in PD.				
Documentation provided by project participant				
Revised PD				
DOE assessment | **Date:** 21/11/2023				
Issues raised during the public hearing period is not yet resolved satisfactorily. Therefore, this CAR is still open. PP should take suitable initiative measures to resolve these two comments.				
Project participant response | **Date :** 22/11/2023				
The public comments have been mentioned in the PD (please refer section 2.1.5). Conversations with organizations are ongoing both verbally and via email. This process is ongoing, and updates will follow upon conclusion. Consent from ranchers/pastoralists will be obtained, and official agreements will be signed if they choose to participate in the project. however, the Laikipia Conservancies Association and Maasai Mara Wildlife Conservancies Association areas are not included in instance 01 at the time of validation.				
DOE assessment | **Date :** 22/11/2023				
With the closer of CL#24 & CL#25 and initiation of FAR#02, this CAR is closed.				
Project participant response | **Date :** DD/MM/YYYY				
Documentation provided by project participant				
DOE assessment | **Date :** DD/MM/YYYY				

CAR ID	06	Section no.	2.5	Date : 29/09/2023
Description of CAR				
Section 2.5 of the PD does not state if the project proponent or any other entity involved in project design or implementation is involved in any form of discrimination or sexual harassment. There PP is requested to update the PD confirming and demonstrating that there is no form of discrimination or sexual harassment within entities involved in the project.				
Project participant response				**Date :** 25/10/2023
Information regarding any form of discrimination or sexual harassment has been updated in the revised PD. Also attached partner ethic policy for VVB reference.				
Documentation provided by project participant				
Partner and Boomitra ethic policy				
DOE assessment				**Date:** 17/11/2023
PP has updated this section of the PD satisfactorily and the finding is closed now.				

CAR ID	07	Section no.	2.5	Date : 29/09/2023
Description of CAR				
Section 2.5 of the PD does not address all matters concerning AFOLU Specific Safeguards. Therefore, PP is requested to update section 2.5 of the PD considering the following- a) identifies any legal or customary tenure/access rights to territories and resources, including collective and/or conflicting rights, held by local stakeholders. b) identifies the location of communities, local stakeholders and areas outside the project area that are predicted to be impacted by the project. c) identifies the location of territories and resources which local stakeholders own or to which they have customary access. d) describes the expected changes in well-being and other stakeholder characteristics under the baseline scenario, including changes to ecosystem services identified as important to local stakeholders; and e) describes how communication and consultation are performed in a culturally appropriate manner.				
Project participant response				**Date :** 20/11/2023
Following the updated template of PDD, this section is removed. Hence updated Section 2 Safeguards and Stakeholder Consultation with all the details required. Community rights, tenure and access to the lands are secured. The livestock all remain within the project boundaries 365 days of the year resulting in minimal impacts to areas outside the project area.				
Documentation provided by project participant				

DOE assessment	**Date:** 21/11/2023
The audit team has checked Revised PD and satisfactorily close this CAR.	

CAR ID	08	**Section no.**	3.4	**Date :** 29/09/2023
Description of CAR				
1. In the section 3.4, Table 4: Minimum specifications on agricultural management practices for the baseline scenario as mentioned in VM0042 methodology guideline is missing. PP is requested to add the minimum specification table as per the methodology requirement. 2. Section 3.5 of the PD does not include sufficient information (i.e., calculation of weighted average of common practice of all project activities) as part of the common practice additionality demonstration.				
Project participant response				**Date :** 21/11/2023
1. This data is present in Baseline survey sheet. Minimum specifications on agricultural management practices for the baseline scenario as mentioned in VM0042 methodology guideline has been updated in the revised PD. *21)* 2. As per the methodology VM0042, in section 7 and page number 16, it mentions that "An individual activity with an existing adoption rate in the relevant region below 20% is always considered additional." Referring to Expert Opinion, we find that individually activity's adoption rate is less than 20%. Hence, weighted average section is not included in the PD.				
Documentation provided by project participant				
Revised PD				
DOE assessment				**Date:** 22/11/2023
1. PP has updated the baseline scenario section of the PD with minimum specifications on agricultural management practices in the revised PD. The CAR is closed now. 2. PP has provided the expert opinion and found that individual activity adoption rate is less than 20% in the project area. The audit team close this CAR satisfactorily.				

CAR ID	09	**Section no.**	5.3	**Date :** 29/09/2023
Description of CAR				
1. Section 5.3 of the of the PD does not describe the procedures for internal auditing and QA/QC. PP is requested to update the PD with sufficient information on: a) The procedures for internal auditing and QA/QC. b) The policies for oversight and accountability of monitoring activities. 2. PP has mentioned that "measurements are done for each project participant rancher separately, which implies 100% sampling. Hence, there is no requirement for this project to adopt any sampling techniques for project areas." PP is requested to explain clearly what does mean by				

100% sampling means. How it will be carried out? If PP is estimated SOC for all sample, then why Roth C model is used?	
Project participant response	**Date :** 20/11/2023
1. The PD has been updated with the procedures for internal auditing and QA/QC. 2. *The section has been revised in PD proper justification on sampling.*	
Documentation provided by project participant	
Revised PD	
DOE assessment	**Date:** 22/11/2023
1. The procedures for internal auditing and QA/QC have been included in the revised PD. This finding is closed now. 2. PP has explained the sampling procedure in the revised PD. The audit team close this finding.	

CAR ID	10	**Section no.**	Kenya Grassland_ER Project_CTR	**Date :** 29.09/2023
Description of CAR				
In the Excel file named Kenya Grassland Project_CTR In the Literature sheet, the audit team could not verify the estimation of the average baseline change CO2 per acre per year. PP cited the reference of Pando 2004 for this estimation, but data used for this estimation did not match with data in the cited research paper. Moreover, i) In the paper observation years were 1996, 1997 and 1999. But in the calculation sheet the starting date is mentioned as 1993-06-01 and the ending date is 1999-06-01. ii) How were 'BAU Start SOC' and 'BAU End SOC' calculated? values are not in verifiable form. iii) Latitude (Column K) and Longitude (Column K) used in this excel sheet could not verify the sampling points. PP is requested to clarify why same latitude and longitude for all the 9 cases of observation. iv) PP is also requested to clarify why the same values of BD and clay content for all the 9 cases in this calculation sheet? If BD, clay content and location are same for all the 9 cases then what is the factor that gives different SOC values for all the cases? Therefore, action needed to provide the updated ER calculation sheet in verifiable form.				
Project participant response				**Date :** 25/10/2023
i. The soil organic matter (SOM) values are from 1993, 1997, and 1999 (see Table-1). The bulk density (BD) values are from 1996, 1997, and 1999. The month and day are not given, so we use the middle of the year. We chose to use the longest record possible 1993-1999 to have the best signal to noise ratio. This is a conservative choice, as using the shorter time periods would increase the Pooled Measurement Uncertainty (PMU) criteria and make it easier for our predictions to pass. There is no 1993 bulk density measurement, so we use the 1996 BD				

value, the closest value in time to the SOM measurement. The 1999 BD and SOM values are used for 1999. The original data we sent used the Soil Grids BD to convert carbon to tons/ha, and that has been corrected to use the BD values from the paper.

ii. These are the values given in the paper, measured from soil samples using the Walkley Black method. In the updated spreadsheet the columns are now called: Start Carbon (original value) and End Carbon (original value). The conversion to carbon in tons/ha is: Carbon tons/ha = SOM / (1.724 som to soc conversion factor) / 100 * (0.3 m soil depth) * (10000 m2 per hectare) * (bulk density kg/m3)

iii. The Lat-Lon is given in the "Research Site" section on page 321 and matches the value in the spreadsheet. The exact locations of the research sites are not given in the paper or the thesis so we took average clay values in a small region around the given location. This does make it harder for us to predict carbon change.

iv. Yes clay and weather inputs to the RothC model are the same for all samples in the Pando 2004 paper. However, the starting carbon values are not, and the predicted carbon change is dependent on the relationship between the starting carbon value and the carbon inputs (residues, manure). The different measured carbon changes in the paper are due to variations in management, measurement error, and other sources (which may include clay, but are not quantifiable with the information available and add error to the model).

Documentation provided by project participant

NA

DOE assessment	**Date:** 17/11/2023

i.The literature used as secondary data source contains much older data (1993, 1997, and 1999) for baseline SOC estimation. Moreover, it is not from the project location. PP is requested to provide more explanation and clarity in this aspect. Therefore, finding is still open.

ii. PP is requested to provide the ER calculation sheet in verifiable format. The CAR is still open.

iii. From the explanation by the PP, it seems that the baseline SOC is estimated on hypothetical data only, as the soil texture (clay %) is taken average without knowing the exact location. PP should provide more explanation to justify the the baseline SOC estimation.

iv. Audit team could not understand, how did residue and manure application impact the grassland SOC. PP should explain for what purpose manure was used and what are the residues in a grassland ecosystem. Clarity is needed and finding is open.

Project participant response	**Date :** 20/11/2023

1.According to the requirements of VMD53v1, we are required to use literature data sourced from studies that match the conditions of the project's baseline scenario and with-project scenarios, in terms of the management, climate zone and other factors. There are very few studies done globally on grazing SOC change under conditions, let alone within the project region itself, and hence we must pull studies from other regions that match the criteria, particularly the climate zone, to build a sufficient dataset that meets the requirements of VMD53. The fact that the data is older does not affect the ability to calibrate the biogeochemical model since it is simply simulating between the endpoints of the study.

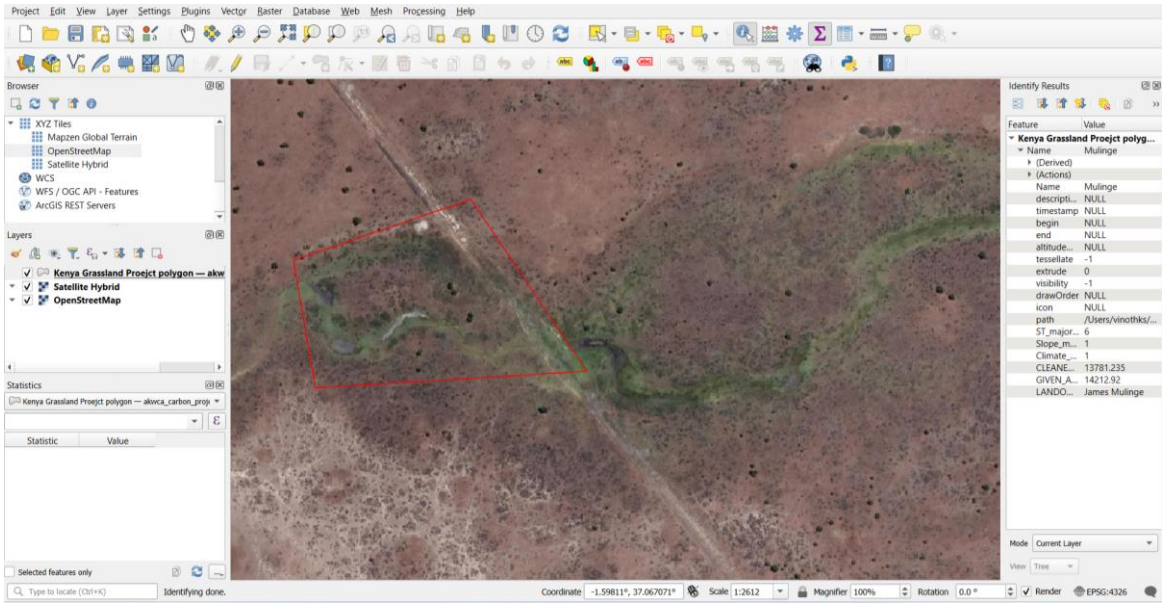
3.The clay value used is approximate during the model calibration and validation since the location is approximate from the paper. However, during the actual estimate of ERs as will be presented in the Model Validation Report, the specific farm polygons will be used for the exact location to determine all the relevant inputs, so there is no hypothetical data used for the actual ER estimations. Ultimately, the fact that approximate clay values are used for calibration and validation of the RothC will only cause the calculated model uncertainty to be a more conservative representation.

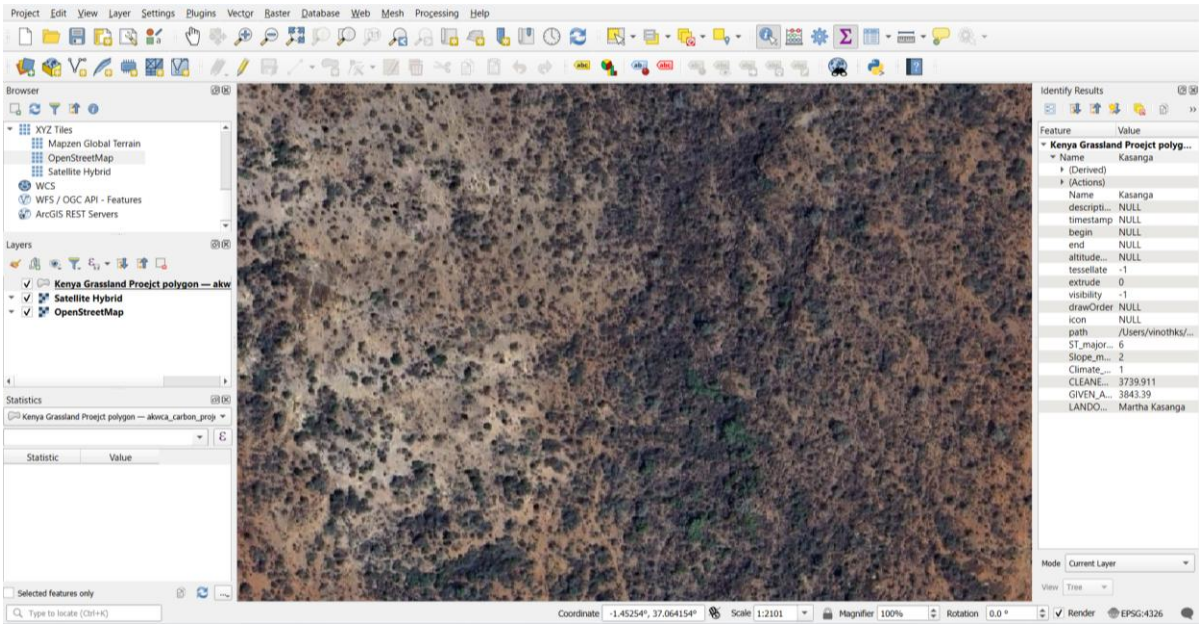
4.Manure is not applied as a separate application in the grasslands. Natural dungs from the animals are deposited directly on the land in the course of grazing. Residues are not manually applied into the grassland. Typically the RothC model has quite a few inputs such as the 'plant residue input', but this term should not be understood as a manual activity of placing residues on the grassland in this project. Rather the 'plant residue input' is the natural residue left behind by the plant from the its stalk and roots as it undergoes its life cycle. Similarly the 'manure' contribution to RothC here would correspond to the natural dung deposition happening during the course of grazing.
Documentation provided by project participant

DOE assessment	**Date :** 21/11/2023
PP has satisfactorily explained the rationality behind use of the older secondary data and clarify that manure is not applied separately in the project area. Therefore, CAR#05 is closed.	
Project participant response	**Date :** DD/MM/YYYY
Documentation provided by project participant	
DOE assessment	**Date :** DD/MM/YYYY

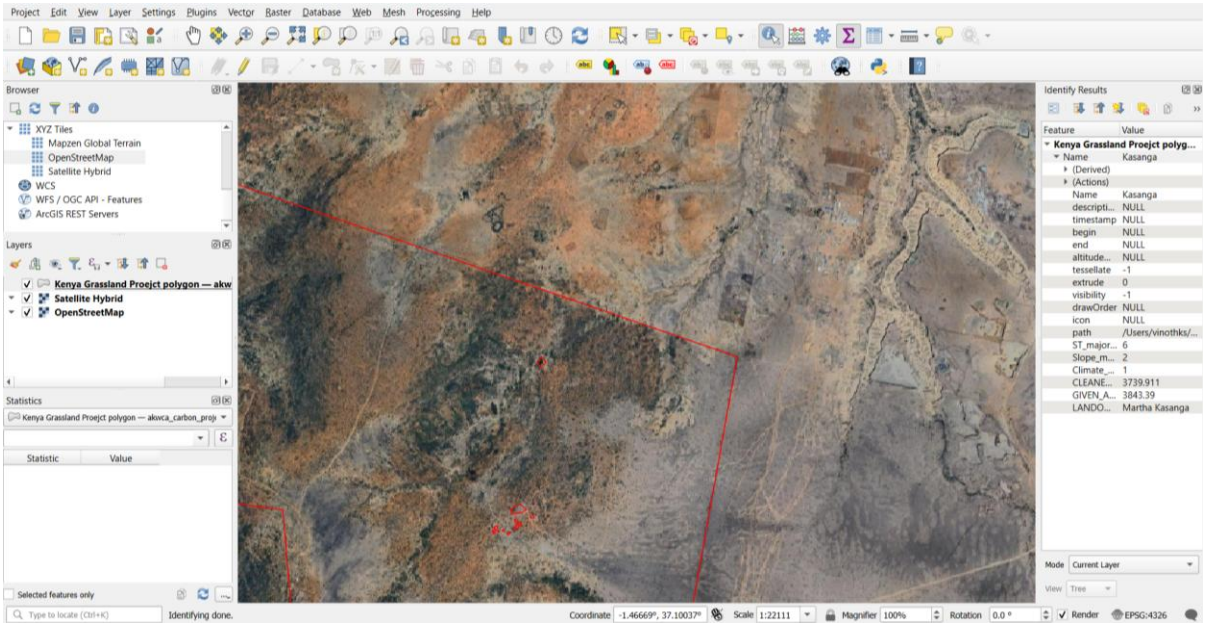
CAR ID	11	**Section no.**		**Date :** 17/11/2023
Description of CL				
There are several water reservoirs, roads and tranches within the PA. According to the representative of implementing partner (EarthAcre Incorporated) mentioned that they have excluded only one such water reservoir. The water bodies (seasonal/perennial) can be considered grassland. Similarly, roads contain rarely grasses due to daily movements of vehicles. Inclusion of such water bodies, roads and tranches within the polygon will significantly impact the SOC estimation. Therefore, PP is requested to exclude such water bodies, roads and tranches from the polygon.				
Project participant response				**Date :** 20/11/2023
The polygons are modified, and water bodies, roads and tranches have been excluded. The Final KMLs have been provided.				
Documentation provided by project participant				
Final KML Files				
DOE assessment				**Date:** 22/11/2023
The revised KML is assessed. Notably the following issues require correction in KML. 1. Water body delineation in Mulinge. 2. Trees patches with canopy in Kasanga.				

3. Rocky patches.





PP is requested to provide clarification regarding the accuracy of the project activity area demarcation, especially in cases where no natural or man-made features align precisely with the boundary demarcation. An explanation detailing the methodology or criteria used for delineating the project area boundaries despite the absence of clear natural or man-made features would be valuable for better understanding the accuracy and reliability of the demarcated area.



Project participant response	**Date :** 22/11/2023
KML has been revised and updated with only eligible areas. Please see responses to CL 27 for further deatiails.	
Documentation provided by project participant	
DOE assessment	**Date:** 22/11/2023
The KML file has been updated, delineating the non-eligible area from the project activity area. However, due to the topography and limited canopy cover in the Kasanga area, precise delineation wasn't achievable. It's important to note that tree patches with low canopy cover are significant in grasslands, particularly in savannah regions which is not in line with definition of grassland in VCS Program Definition V4.4. Satellite data with submeter spatial resolution, which is not publicly available, would be required for accurate assessment in this ranch area. As a result, CAR#11 is closed, and FAR#01 has been initiated for further assessment during verification.	

CAR ID	12	**Section no.**		**Date :** 11/08/2024
Description of CL				
Issue The initial project activity instance (PAI) is located in Kenya, but the grouped project will be expanded to a region that includes two other countries, Tanzania and Uganda. Therefore:				

a. There is insufficient evidence that a geographic area that includes three different countries is valid for the project. Insufficient demonstration that the future PAIs (Project Activity Instance) will have the same baseline scenario and additionality as the initial PAIs,
b. The project does not demonstrate compliance with the baseline and additionality requirements for the design of grouped projects. For example, it is not clear how baseline and additionality can be considered the same in Kenya (i.e., the country of the first PAI) when land ownership and management are different (e.g., communal land, wildlife grazing land, private land; Sections 1.8, 1.12).

22)

Action Required

1. PP must ensure that Section 1.5 of the project description (PD) is updated to demonstrate that a single baseline scenario and the same rationale for demonstrating additionality can be established for the entire uniquely defined geographic area. Otherwise, the project must:
    a. redefine or divide the geographic area.
    b. specify at least one set of eligibility criteria for the inclusion of new PAIs for each combination of project activity and geographic area, and for each combination of baseline scenario and demonstration of additionality.
    c. exclude from the project the geographic areas with no initial project activity instances; and
    d. update all related sections of the PD according to output from a, b, and c, including Baseline and Additionality sections.

Program Rule(s)

VCS Standard, v4.5, Sections 3.6.10 to 3.6.16.

Background

Section 3.6.10" Geographic areas with no initial project activity instances shall not be included in the project unless it can be demonstrated that the same (or at least as conservative) baseline scenario and rationale for the demonstration of additionality is applicable to such an area as a geographic area that does include initial project activity instances."

Project participant response	**Date :** 21/08/2024

1. The project boundary has been redefined and PD has been updated by eliminating the other two countries of Tanzania and Uganda to adhere as per the VCS Standard v4.5 requirements.
    a. The geographic area of the project has been redefined, and the revised project boundary includes only Kenya.
    b. The Section 1.5.1 of the PD has been updated with the details of eligibility criteria for inclusion of new PAI for each combination of project activity and geographic area, and for each combination of baseline scenario and demonstration of additionality.
    c. The geographic area with no project activity instances have been excluded.
    d. All the related sections of the PD are updated according to the action required

Documentation provided by project participant

Updated PD

DOE assessment	**Date:** 22/08/2024
Following a thorough review of the revised PD, the audit team has determined the following conclusion for this finding: a. The PP had redefined the project boundary to include only Kenya in the updated PD. The revised project boundary excludes the other countries, viz. Tanzania and Uganda. But the PP has not given the rationality or justification for excluding these two predefine countries from the project boundary. The PP is requested to provide the justification for the redefined project boundary. Therefore, this finding stands open. b. In accordance with the VCS standard v4.5 requirement, the PP has included details of the eligibility criteria for the inclusion of new PAI for each combination of project activity, baseline scenario, and demonstration of additionality in section 1.5.1 of the updated PD. CAR is closed now. c. The project boundary has been revised and geographic area with no project activity instances have been excluded. *CAR stands closed now.* d. The PP has updated all related sections of the PD according to output from the above-mentioned findings, including Baseline and Additionality sections. Therefore, CAR is closed satisfactorily. *23)*	
Project participant response	**Date :** DD/MM/YYYY
a. The project boundary has been redefined and PD has been updated by eliminating Tanzania and Uganda to adhere to the VCS Standard v4.5 Section 3.6.10 which mentions that geographic areas with no initial project activity instances shall not be included in the project unless it can be demonstrated that baseline scenario and additionality is applicable for such areas. Since, there is no initial project activity instances included in from Tanzania and Uganda and do not suffice the single baseline scenario and additionality the project boundary has been revised. According to Section 3.6.13, Boomitra has redefined the geographic area such that a single baseline scenario can be determined for the revised geographic area or areas. Hence, the project boundary has been revised to Kenya only.	
Documentation provided by project participant	
VVB assessment	**Date :** DD/MM/YYYY
The project boundary has been revised to exclude Tanzania and Uganda, as outlined in the updated Project Description (PD). This change ensures compliance with VCS Standard v4.5, Sections 3.6.10 and 3.6.13, which require that geographic areas without initial project activity instances be excluded unless a single baseline scenario and additionality can be demonstrated. With the boundary now limited to Kenya and the revisions clearly stated in the PD, the finding is considered closed.	

CAR ID	13	Section no.		Date : 11/08/2024

Description of CAR

Issue

1. Section 1.8 of the PD, demonstration of project ownership is insufficient:
    a. The section describes that the project proponent has the legal rights to the carbon benefits generated by the project activities. However, it is unclear if project ownership, i.e. the legal right to control, operate, and implement the project activities is vested in the project proponent (PP), since the agreement for project activities implementation is between the landowner and "The ATHI KAPITI WILDLIFE CONSERVANCIES ASSOCIATION".
    b. It is unclear whether the lands included in the initial PAI are privately owned or community owned. Since this is inconsistently described in other sections of the PD. Section 1.11 states that at the time of validation, only private landowners have been included; Section 2.4.3 states that community lands will be included in the future.
    c. It is unclear what are the lands owned by "other entities" and how is ownership established in this case.
    d. It is unclear how ownership of land set aside for core wildlife conservation and community land (with mixed use conservancies for settlement, wildlife and livestock) is established.
2. It is not clearly described in the PD whether each of the three ranches included in the initial PAI has a single landowner or is comprised of multiple landowners. If the land parcels are comprised of multiple landowners, it is unclear if all landowners have provided consent and have project agreements.

Action Required

1. PP must ensure that Section 1.8 of the PD is updated to:
    a. Demonstrate that the project proponent holds the legal right to operate and manage the project.
    b. Provide a clear description of the land ownership of the parcels of the initial PAI. This must be consistent across the PD.
    c. Clarify whether each of the land holdings included in the initial PAIs belong to single, individual landowners or multiple landowners.
    d. Demonstrate that all landowners have entered into agreements with the project where the carbon rights and project ownership are vested in the project proponent. If the project proponent does not have control of 80% of the first project activity instance, Section 3.11.4(3) of the *VCS Standard, v4.5* must be followed.
    e. Demonstrate how the project guarantees ownership and permanence for each of the different types of land ownership.

Program Rule(s)

VCS Standard, v4.5, Section 3.7.1 and 3.11.4

Project participant response	Date : 21/08/2024

CAR ID	13	Section no.		Date : 11/08/2024
Description of CAR				
1. PP has updated the PD and is as follows *24)* *25)* a. The section 1.8 of the PD has been updated to provide clear explanation on who owns the legal rights to control, operate and implement the project activities. The roles and responsibilities of the Origination Partner and Intervention Coordinator has been described in the Section 1.7 of the PD. *26)* *27)* b. Section 1.8 of the PD has been updated to clearly mention the ownership of PAI and the ownership type for the future instances. *28)* *29)* c. The 1st PAI land holding status has been updated in the Section 1.8 and Section 1.12 of the PD *30)* *31)* d. The PD has been updated with ownership details and explained that the landowners have entered into agreements with Intervention Coordinator (IC) and IC in turn have signed an agreement with Boomitra to vest the carbon rights to Boomitra. Boomitra has control of 80% of the first project activity instance and this has been demonstrated in the PD. *32)* *33)* e. Section 1.8 has been updated with information regarding the guarantees of ownership and permanence of each landownership type.				
34)				
Documentation provided by project participant				
Ownership documents and revised PDD				
DOE assessment				**Date:** 22/08/2024

CAR ID	13	Section no.		Date : 11/08/2024
Description of CAR				

The audit team has examined the revised PD and ownership documents and has reached the following conclusions based on the responses to the raised findings.

a. The PP has provided comprehensive information on credit ownership, illustrating how it possesses the legal authority to oversee and manage the project. In section 1.8 of the revised PD, the PP has outlined two legal agreements: (i) an agreement between Rancher and the Intervention Coordinator (AKWCA) that allows for the transfer of carbon rights from pastoralists to AKWCA for collective management and representation, and (ii) an agreement between the Intervention Coordinator and Boomitra that grants ownership of carbon credits to Boomitra, as well as control over project activities and land use management within the area covered by the carbon rights agreement with pastoralists. The audit team has reviewed the agreement documents and has closed the findings.
b. In section 1.8 of the revised Project Description (PD), the PP has outlined three primary types of land ownership prevalent in the project area. The PP has detailed the rights associated with each type of ownership and the management activities that correspond with them. Additionally, the PP has specified that, at the time of validation, privately owned individual grassland ownership was taken into account for project implementation. The PP clarifies that the other two types of land ownership might be incorporated in future PAI. With a clear understanding of the land ownership among project participants, the audit team closes this finding.
c. The PP has clarified that only privately owned individual grassland ownership was taken into account for project implementation in the first PAI. In this type of land ownership, an individual person has all the rights over the land and land use is primarily intended for livestock rearing. With the clarification from the PP on landownership of the participating ranchers, the finding stands closed.
d. After carefully reviewing the revised PD and provided legal agreements, the audit team confirmed that the PD has been updated with ownership details and explained that the landowners have entered into agreements with the Intervention Coordinator (IC), who has then signed an agreement with Boomitra to vest the carbon rights in Boomitra. Boomitra has control over 80% of the initial project activity instance, as demonstrated in the PD. The finding is closed now.
e. The audit team confirms that section 1.8 of the revised PD has been amended with information about the guarantees of ownership and the permanence of each landownership type. The finding is closed now.

CAR ID	14	Section no.		Date : 11/08/2024
Description of CAR				

Issue

The project start date is not sufficiently supported and justifications are inconsistent:

a. Section 1.9 of the PD states that the start date is supported by training records and monitoring data.

b. The VR indicates that the start date is linked to the date of purchasing of fencing poles.
c. There is no justification in PD that how the project start date is clearly linked to the start of GHG emission reductions and removals (ERRs)

Action Required

PP must ensure that Section 1.9 of the PD is updated to describe and provide evidence of the specific activities designed and implemented by the project, that led to the actual generation of GHG ERRs, according to Section 3.8 of the *VCS Standard, v4. 5..*

Program Rule(s)
VCS Standard, v4.5, Section 3.8

VCS Program Definitions, v4.4, "Crediting Period Start Date"

Project participant response	**Date :** 21/08/2024
Section 1.9 of the PD is updated with the detailed explanation of the evidence used to prove the start date of the project.	
Documentation provided by project participant	
Start date evidence – Receipts of payment made to the laborers.	
VVB assessment	**Date:** 22/08/2024
The PP has updated the project start date as 10th January 2019 with detailed explanation of project activity and justification for GHGs emission reduction and removal. In section 1.9 of updated PD, the PP has mentioned that creation of paddocks was the project activity that provide the rest period for forage to grow back. Commencement of fencing activities is the initial activity for paddock creation and rotational grazing. As a proof, PP has provided the receipts of payment made in the form of petty cash voucher to labours employed for digging in holes and fixing the poles for paddock demarcation, dated January 10th, 2019. The audit team is agreeing with PP's justification that the creation of paddocks is one of the initial activities for rotation grazing and resting period for forage growth which linked with GHGs emission reduction and removal. With the provided justification of the project start date, the finding is closed now.	

CAR ID	15	**Section no.**		**Date :** 11/08/2024
Description of CAR				
Issue Section 1.12 of the PD does not clearly describe which of the improved ALM activities have been implemented or will be implemented by the project and in which locations of the initial PAI.				

CAR ID	15	Section no.		Date : 11/08/2024

Description of CAR

Action Required

1. PP must ensure that Section 1.12 of the PD is updated to provide a detailed description and information for each of the improved ALM project activities that have been implemented and that will be implemented by the project throughout the crediting period.
2. The list of project activities must be written clearly to reflect all activities of future instances to allow assessment of future instances against eligibility criteria per Section 3.6.16(2) and (3), *VCS Standard, v4.5*. In addition, clarification in the following must also be provided:
    a. How the implementation of the project activities will differ in the 3 scenarios.
    b. How rotational grazing will be enforced in unfenced areas.
    c. How the removal of fences for open land and communal grazing will not lead to overgrazing.
    d. Whether additional paddocks will be rented in or outside the project area during the dry season.

Program Rule(s)

VCS Standard, 4.5, Section 3.2.4

VCS Project Description Template, v4.3

Project participant response	Date : 21/08/2024

1. A detailed description of each of the improved ALM project activities that have been implemented and that will be implemented by the project throughout the crediting period has been updated in Section 1.12 of the PD. A table is added in the same section comparing the grassland management practices in baseline and project scenario. The list of project activities for the current instance and future instances are available in the PD.
    a. The implementation of the project activities in three different scenarios has been updated in the section 1.12 under the heading 'Implementation of project activities in this project'.
    b. The section 1.12 of the PD under the title 'Grazing Model' is updated with the information about the grazing situation in unfenced land.
    c. The details communal grazing not leading to overgrazing in updated in the section 1.12 of the PD under the title 'Grazing Model'.
    d. The details communal grazing not leading to overgrazing in updated in the section 1.12 of the PD under the title 'Grazing Model'.

Documentation provided by project participant

Revised PD

DOE assessment	Date: DD/MM/YYYY

CAR ID	15	Section no.		Date : 11/08/2024

Description of CAR

1. The audit team confirms that PP has incorporated a detailed description of each improved project activity that been implemented and that will be implemented by the project throughout crediting period in section 1.12 of the PD. Therefore, the finding is closed now.
2. Although PP has incorporated (a) the implementation of the project activities in three different scenarios has been updated in the section 1.12 under the heading 'Implementation of project activities in this project', (b)'Grazing Model' with the information about the grazing situation in unfenced land, (c) details communal grazing not leading to overgrazing in the section 1.12 of the PD under the title 'Grazing Model', the audit team could not find the update list of project activities clearly reflecting all activities of future instances to allow assessment of future instances against eligibility criteria per Section 3.6.16(2) and (3), *VCS Standard, v4.5*. There for PP is requested to update the list activities aligning section 3.6.16(2) and (3) *of the VCS Standard, v4.5*. Moreover, PP is requested to clarify whether additional paddocks will be rented in or outside the project area during the dry season. The finding stands open.
   35)

Project participant response	Date : DD/MM/YYYY

Section 1.12 of the PD includes the list of project activities which shall be applicable for future instances as well. Also Section 1.5.1 of the PD demonstrates on how the new project activity instance shall meet the minimum eligibility criteria as per clause 3.6.16 of VCS Standard v4.5.

No additional paddocks will be rented in or outside the project area during the dry season. This has been also updated in the PD under the title 'Grazing Model'.

Documentation provided by project participant

VVB assessment	Date: DD/MM/YYYY

The audit team has reported that PP has revised sections 1.12 and 1.5.1 of the PD to illustrate how the new PAI fulfill the minimum eligibility criteria. Furthermore, PP has revised the 'Grazing Model' section of the PD to indicate that no additional paddocks will be rented within or outside the project area during the dry season. Therefore, finding is closed.

CAR ID	16	Section no.		Date : 11/08/2024

Description of CAR

Issue

1. Section 2.1 and Appendix 2 of the PD do not contain sufficient information on the following:
    a. Whether all stakeholders mentioned in Section 2.1.1 of the PD participated in the meetings. While the PD mentions that more than 160 participants attended the local stakeholder consultation meeting, there is no description of the participants and no clarity on whether all the identified stakeholder groups were represented.
    b. Details of the surveys used for stakeholder engagement and consultation and the feedback obtained from the same or the number of stakeholders who participated in the survey.
    c. How the project will ensure local stakeholder consultation for new project activity instances considering that the LSC is undertaken at the level of the grouped project.
    d. In Section 2.1.2, how a meeting conducted via Zoom platform was accessible to pastoralists and how communication and consultation are performed in a culturally appropriate manner, including language and gender sensitivity, directly with local stakeholders or their legitimate representatives when appropriate (see Background).
    e. In section 2.1.3, how FPIC was obtained for all three different scenarios described in the Section 1.8 (Project Ownership) section.
    f. How stakeholder feedback and input was considered in project design and implementation, since the project stakeholder consultation was conducted after project start.
    g. In section 2.1.3(FPIC), how the project demonstrates that the principles of FPIC were followed as the agreements with the landowners, and the stakeholder consultation (July 2023) were conducted after the project start date (04 January 2019).
    h. The risks to local stakeholder resources due to project implementation (e.g., trade-offs with food security, land loss, loss of yields and climate change adaptation).
2. Section 2.4 of the PD contains inconsistent information:
    a. Impacts of biodiversity: The PD states that the project is an agriculture project, and there is no impact on biodiversity. Further, in Section 2.4.1 it is stated that the project is not located in or adjacent to habitats for rare, threatened, or endangered species. However, this contradicts the statement that the project area includes core wildlife areas, and that multi species grazing, including wildlife species, is a part of the project.
3. Fertilizer use: There is no discussion of risk from excess fertilizer uses and other bio/chemical inputs due to project activity. Also, the PD does not include a mitigation plan on how the project will mitigate and monitor this risk.
4. Section 2.3.5 it is unclear how the benefit sharing will occur.

Action Required

1. PP must ensure that Section 2.1 of the PD is updated to include all information listed in Issue 1 above.
2. PP must ensure that Section 2.4 of the PD is updated to correct the inconsistent information about impacts on biodiversity and fertilizer use.
3. PP must ensure that Section 2.3.5 of the PD is updated to provide details on how benefit sharing will occur.

Program Rule(s)

VCS Standard, v4.5, Sections 3.18 and 3.19

Background

Section 2.1.4 of the PD states that a physical register will be maintained for continuous input/grievance as some stakeholders do not have access to phone/internet services. Therefore, it is not clear how these stakeholders were included in the initial stakeholder consultation.

Project participant response	**Date :** 21/08/2024
1) Section 2.1 and Appendix 2 of the PD has been updated with the following details. a) A table has been added in the Appendix 2 of the PD representing the participant profile and number of participants of the LSC meeting. The section has been revised to give clarity on the participation of the stakeholders. b) Details about the surveys used for Stakeholder engagement and consultation and feedback obtained has been added in Section 2.1.2 of the PD. c) Details about the ongoing consultation for new added project activities instances is added in the Section 2.1 of the PD. d) Section 2.1.2 & Appendix 2 of the PD has been updated to provide more information of the platform chosen and conducting the consultation as per the cultural appropriate manner. e) Section 2.1.3 of the PD has been updated with required information about the FPIC process for the different land tenures scenarios. f) Appendix 2 of the PD is updated with more information regarding the stakeholder feedback. g) Section 2.1.3 of the PD has been updated to provide more information on the principles being followed on agreement with the rancher/pastoralist and the stakeholder consultation h) The risks to local stakeholder resources due to project implementation has been updated the section 2.2 of the PD. 2) Section 2.4 of the PD is updated with the following information: a) The table in section 2.4 has been updated with the potential risk associated with the project and their mitigation measures. Section 2.4.1 has also been revised 3) Section 2.4 has been updated with the risk category and mitigation measure for the fertiliser usage. 4) Section 2.3.5 of the PD has been updated with more details about the benefit sharing agreement.	
Documentation provided by project participant	
Updated PD, LSC Invitee List, Capacity Building and training records.	
VVB assessment	**Date:** 22/08/2024
1. The PP has updated section 2.1 and Appendix 2 of the PD incorporating with (a) table has been added in the Appendix 2 of the PD representing the participant profile and number of participants of the LSC meeting. The section has been revised to give clarity on the participation of the stakeholders, (b) Details about the surveys used for Stakeholder engagement and consultation and feedback obtained, (c) ongoing consultation for new added project activities instances, (d) information of the platform chosen and conducting the consultation as per the cultural appropriate manner, (e) information about the FPIC process for the different land tenures scenarios, (h) risks to local stakeholder resources due to project implementation. However, PP did not clearly justify how stakeholder feedback and input was considered in project design and implementation, since the project stakeholder consultation was conducted after project start and how the project demonstrates that the principles of FPIC were followed as the agreements with the landowners, and the stakeholder consultation (July 2023) were conducted after the project start date (04 January 2019). Therefore, the finding remains open 2. *The audit team confirms that PP has updated section 2.4 of the with appropriate and consistent information about impacts on biodiversity and fertilizer use. The finding is closed.* 3. *The PP has incorporated detailed information about the benefit sharing agreement in the section 2.3.5 of the PD*. Therefore, the finding is closed now.	
Project participant response	**Date :** DD/MM/YYYY

The narrative has been revised regarding considering stakeholder feedback and input in project design and implementation as the stakeholder consultation happens to be after the project start date. This has been updated on page 189, Appendix 2. A paragraph titled 'FPIC Process' in Appendix 2 of the PD has been added to clearly mention about the demonstration of FPIC when the agreement with the landowners, and the stakeholder consultation (July 2023) were conducted after the project start date.
Documentation provided by project participant

VVB assessment	**Date:** DD/MM/YYYY
1.f) Based on VVB assessment the explanation provided in Appendix 2 regarding stakeholder consultation does not align with section 3.18.2 of VCS standard v4.5. In Stakeholder consultation training and other aspects cannot be covered. The LSC must cover aspects mentioned in section 3.18.2 & 3.18.8. 1g). Also, stakeholder consultation and FPIC for project validation must be conducted before the project start date. *36)* Finding remains opened.	

Project participant response	**Date :** DD/MM/YYYY
1) f. A detailed document mentioning about the chronological timeline of standard version applicable for this project is provided for assessment. It clearly describes the process followed by Boomitra in conducting the local stakeholder engagement and consultation in accordance with the relevant versions and sections of the VCS standard. 1) g. Section 2.1, 2.1.3 and Appendix of the PD is revised with more details regarding stakeholder consultation and FPIC process conducted in the project area.	

Documentation provided by project participant
1. CAR16_responses document 2. PDF on Capacity-building and interactive sessions with regional ranchers conducted by AKWCA (project's intervention coordinator)

VVB assessment	**Date :** 22/10/2024
1) Based on the listing PDD the LSC and FPIC was done following standard v4.2 which was later change at the time of registration request and based on the VCS standard v4.2 (Section 3.17.3, 3.17.4, 3.17.5, 3.17.11,3.17.12, 3.17.13, 3.17.14, 3.17.15, 3.17.16,3.17.17, 3.17.18 & 3.17.19 which does not elaborate on how and what needs to be done in Stakeholder consultation. Finding is closed. 2) Based on the listing PDD the LSC and FPIC was done following standard v4.2 which was later change at the time of registration request and based on the VCS standard v4.2 (Section 3.17.3, 3.17.4, 3.17.5, 3.17.11,3.17.12, 3.17.13, 3.17.14, 3.17.15, 3.17.16,3.17.17, 3.17.18 & 3.17.19 which does not state anywhere that LSC needs to be before project activity implication. *37)* *38)* Also, VCS standard Appendix 3 states that the project with project start date before 23, October 2023 need not apply 3.18.2 of VCS standard. Finding is closed. *39)*	

CAR ID	17	Section no.		Date : DD/MM/YYYY
Description of CAR				

Issue

The applicability conditions listed in Section 3.2 of the PD do not provide enough justification.

a. No decline in productivity is not supported by peer-reviewed and/or published studies on the activity in the region or a comparable region as required by the methodology.

It is unclear whether the project will use a biogeochemical model or not. If a model will be used, it is not demonstrated that the model can be used throughout the project area.

Action Required

1. PP must ensure that Section 3.2 of the PD is updated to:
    a. Demonstrate no decline in productivity. As required by the methodology, peer-reviewed and/or published studies on the activity in the region or a comparable region must be used to support the claim that the project does not lead to a decline in productivity.
    b. Clarify whether a model will be used to simulate carbon stocks changes by the project (the table mentions that no model is used, however, the PD also includes a description of the model). If a model is used, the project must demonstrate using peer-reviewed scientific studies that the model is capable of successfully simulating changes in soil organic carbon. Evidence must be provided for a comparable ecoregion or for the same region.

Program Rule(s)

VM0042, v1.0, Section 4

Background

b. The peer-reviewed scientific studies used by the project to show that the model successfully simulates changes in soil organic carbon are for Europe, Australia, Scottish uplands, and the USA. The project has not provided sufficient evidence to show the model is applicable for use in the same ecoregion as the project

Project participant response	Date : 21/08/2024

Section 3.2 of the PD has been revised and updated to demonstrate there is no decline in productivity. As required by the VM0042 v1.0 methodology, peer-reviewed studies on the activity in the region or a is used to support the claim that the project does not lead to a decline in productivity. PD also demonstrates using peer-reviewed scientific studies that the model used by the project is capable of successfully simulating changes in soil organic carbon. Evidence is also provided for the same region.
Documentation provided by project participant
Revised PD.
VVB assessment | **Date:** DD/MM/YYYY
The PP has amended Section 3.2 of the PD to demonstrate that productivity is not declining. As required by the VM0042 v1.0 methodology, peer-reviewed research on regional activities is used to support the claim that the project does not reduce production. PD also demonstrates, via peer-reviewed scientific papers, that the project's model can successfully simulate changes in soil organic carbon. The PP has also added a reference from the same region. With the inclusion of detailed explanation on no significant productivity declination, the finding is closed now.

CAR ID	18	**Section no.**		**Date :** DD/MM/YYYY
Description of CAR				
Issue 1. Section 3.3 of the PD does not provide sufficient demonstration for why several GHG sources are excluded from the project boundary under the baseline and project scenario. No demonstration has been provided by using CDM AR methodological tool for testing significance of GHG emissions in A/R CDM project activities that the following GHG emissions sources are considered *de minimis*: a. Fossil fuel: Considering that project activities include water management, including digging of ponds using tractors. b. Manure deposition and enteric fermentation: Considering that livestock are present in the baseline or project scenario. c. Nitrogen fertilizers: Considering that reduction of nitrogen fertilizer is part of the project activities. Action Required PP must ensure that Section 3.3 of the PD is updated to provide sufficient justification for the exclusion of the GHG emission sources: Fossil fuel, manure deposition, enteric fermentation and nitrogen fertilizer. If the excluded sources are determined *de- minimis*, this must be demonstrated using the CDM tool. Sections 5.1 and 5.2 of the PD must be updated to include all relevant parameters as needed.				

Program Rule(s)

VM0042, v1.0, Section 5 (Table 3)

Project participant response	**Date :** 21/08/2024
Significance of relevant sources calculated using CDM tool and revised the section 3.3 of PD This tool shows that SOC significantly dominates the scope of greenhouse gas (GHG) emissions compared to other sources within the project scope. SOC alone contributes 99% of total emissions as can be seen in the excel sheet. Hence No changes foreseen to Sections 5.1 and 5.2 of the PD.	
Documentation provided by project participant	
Revised PD, *Excel sheet demonstrating the GHG sources significance test.*	
VVB assessment	**Date:** 22/08/2024
The PP has updated section 3.3 of the PD providing justification for the exclusion of the GHG emission sources *such as* Fossil fuel, manure deposition, enteric fermentation and nitrogen fertilizer. It is mentioned that PP has used the 'CDM AR Methodological Tool for Testing the Significance of GHG Emissions in A/R CDM Project Activities v1.0' to determine the de-minmis. But the audit team has not received the Excel *sheet demonstrating the GHG sources significance test. The PP is requested to provide the Excel file. The CAR#18 remains open.*	
Project participant response	**Date :** DD/MM/YYYY
Documentation provided by project participant	
VCS 3340-Demonstration of significance of GHG sources excluded or included.xlsx	
VVB assessment	**Date:** DD/MM/YYYY
The Project Proponent (PP) has addressed the findings related to the exclusion of specific GHG emission sources in Section 3.3 of the Project Description (PD). The updated sections now provide comprehensive justification for the exclusion of fossil fuel emissions, manure deposition, enteric fermentation, and nitrogen fertilizer as GHG sources. This justification aligns with the 'CDM AR Methodological Tool for Testing the Significance of GHG Emissions in A/R CDM Project Activities v1.0' to determine whether these sources are de minimis. Additionally, the PP has provided an Excel sheet that demonstrates the GHG sources' significance test. This detailed analysis reveals that soil organic carbon (SOC) accounts for 99% of the emissions, thereby supporting the exclusion of the aforementioned GHG sources as de minimis. With these revisions and the provided evidence i.e. excel file, the required actions have been fully addressed, and the finding is now considered closed.	

CAR ID	19	Section no.		Date : 11/08/2024

Description of CAR

Issue

1. The baseline scenario described in Section 3.4 of the PD is not consistent with the three types (scenarios) of land tenure/land uses described in Sections 1.8 and 1.12 of the PD (e.g., mixed wildlife-livestock areas, community conservancies and individual commercial ranches)
2. In Section 3.4 of the PD, there is insufficient description of:
   a. The length of the period used to develop the schedule of activities (e.g., t=-x).
   b. The minimum specifications on each agricultural management practice for the baseline scenario, based on Table 4 of *VM0042, v1.0*, including qualitative and quantitative information.
   c. The evidence used to establish the minimum specifications of the agricultural management practices for the baseline scenario based on Box 1, Section 9, of *VM0042, v1.0*.

Action Required

PP must ensure that Section 3.4 of the PD is updated to include all the information highlighted above as per the requirements of Section 6 of the applied methodology.

Program Rule(s)

VM0042 v1.0, Sections 6 and 9

VCS Standard, v4.5 Sections 3.6.10 to 3.6.16

Project participant response	Date : 21/08/2024

1. The Section 3.4 of the PD is updated to give more information about the baseline scenario in the three scenarios of land tenure/land uses.
2. Section 3.4 of the PD is updated with the following details:
   a. The length of the period used to develop the schedule of activities is updated in the PD.
   b. The minimum specifications on each agricultural management practice for the baseline scenario are updated along the baseline survey details about the project providing information about qualitative and quantitative information details as well.
   c. Details about the evidence used to establish the minimum specifications of the agricultural management practices for the baseline scenario based on Box 1 are updated in the PD.

Documentation provided by project participant

Revised PD

DOE assessment	Date: 22/08/2024

CAR ID	19	Section no.		Date : 11/08/2024

Description of CAR

1. The audit team has reviewed the revised PD and confirmed that the PP has added detailed information on baseline scenario consistent with the three types of land tenure, viz., Community managed and owned landownership, Private ownership with Communal Land Management and Private owned individual grasslands. The baseline scenario in each land tenure category has been described focusing on prevailing livestock grazing activities, knowledge on modern sustainable grazing practices, impacts of overgrazing, ecological imbalance, wildlife conflicts, etc. With the detailed and clear information in the three different grassland tenures, the finding is closed now.
2. In section 3.4 of the updated PD, the PP has incorporated the following information-
    a. The length of the period used to develop the schedule of activities: The PP has mentioned that the most likely baseline scenario is the continuance of traditional pre-project agriculture practices. The baseline scenario is based on the historic look-back period described in Section 6 of VM0042. The activity schedule, which began with year t = -3, was used in the baseline scenario starting with t = 1. Agricultural management practices were determined for each year (t = -1 to -3). Agricultural management practices were determined for each year (t = -1 to -3).
    b. Information about both qualitative and quantitative information details, are updated together with the minimal requirements for each agricultural management technique for the baseline scenario.
    c. Detailed information regarding the evidence that was utilized to determine the minimal requirements for the agricultural management techniques in the baseline scenario based on Box 1.

The information provided by the PP in the updated PD is appropriate and sufficient to depict the baseline scenario. Therefore, the CAR#19 is closed.

CAR ID	20	Section no.		Date : 11/08/2024

Description of CAR

<u>Issue</u>

1. Regulatory Surplus: Section 3.5.1 of the PD is incomplete. There is no description of the laws assessed that confirm that the project meets the definition of regulatory surplus.
2. STEP1 (Barrier analysis):
    a. The demonstration of cultural and/or social barriers is not supported by peer-reviewed and/or published studies as required by the Methodology.
    b. The project has not identified barriers for each individual improved ALM activities to be implemented by the project.
    c. Barriers were not identified against the adoption rate of a single spatial boundary. Since the project is a grouped project, it is unclear how the results are representative of all project areas. (See Finding 1).
3. STEP 2 (Common practice):
    a. The project area was not stratified into project spatial boundaries (e.g., state or provincial level) in order to demonstrate that the project activities are not a common practice.

CAR ID	20	Section no.		Date : 11/08/2024
Description of CAR				

b. The project has used expert opinion to assess common practice. This is allowed if there is insufficient data for the project region (See Background). However, there is insufficient.
c. The geographic boundary of the grouped project is defined across three countries. It is unclear how the demonstration of additionality at the time of validation is appropriate and representative of future instances (See Finding 1)

Action Required

1. PP must ensure that Section 3.5 of the PD is updated to:
    a. Demonstrate regulatory surplus with evidence.
    b. Demonstrate cultural and/or social barriers using relevant references.
    c. Identify barriers aapplicable to each of the improved ALM activities of the project.
    d. Demonstrate how the identified barriers are representative of the whole project geographic area. Otherwise, the geographic area must be redefined or divided (Finding 1).
    e. Include all information regarding common practice analysis listed in Issue 3 above. The project must demonstrate that the parameters used are the most recent available.

Program Rule(s)

VM0042 v1.0, Section 7
VCS Standard, v4.5, Sections 3.6.10, 3.6.11, 3.6.14

Background

Common Practice: The project area must be stratified to the state or provincial level (or equivalent second-order jurisdiction) in the countries where the project is being developed. Evidence of each proposed project activity must be provided and used to calculate the common practice adoption rate (i.e., Equation 1 if stacked). Where supporting evidence is unavailable at the state/provincial level (e.g., in developing countries), aggregated data or evidence at a national or regional level may be used with justification. Further, independent expert attestations are only used where evidence is not available from any of the listed sources.
Where stratification based on geopolitical boundaries is impractical (e.g., due to lack of data), other forms of stratification, such as major soil types or cropping zones, may be used with justification. The same stratification approach and data sources must be applied across the entire project to maintain the integrity of the common practice demonstration.
Furthermore, the adoption rate must be demonstrated for each country.
The project activities can only be considered additional if the implementation of the project applies both of the project activities simultaneously. Furthermore, this also has implications of project start date, the project start must be based on the first GHG ERR that is additional, in this case, if both activities are implemented simultaneously (See Finding 6).

When evidence on the proposed project activity, or suite of activities, in the region is not available from any of these sources, the project proponent may obtain a signed and dated attestation statement from a qualified independent local expert (e.g., agricultural extension agent, accredited agronomist) stating that the proposed project activity, or suite of activities, is not common practice in the region.

Project participant response	Date : 21/08/2024

CAR ID	20	Section no.		Date : 11/08/2024
Description of CAR				
1) Section 3.5 of the PD is updated to the following details: a) The section is updated with demonstration of regulatory surplus with evidence. b) Demonstrated cultural and/or social barriers using relevant references. c) The PD already Identified significant barriers applicable in consultation with implementing partner on the ground and demonstrated with sufficient evidence. There are several studies suffice the project identified barriers for each ALM adopted by ranchers now included in the PD. d) The demonstration of identified barriers is representative of only Kenya project geographic area and excluded other project geographic areas listed earlier. Hence the geographic area has been redefined updated (Finding 1). e) Although several studies have been conducted, there is a significant lack of data related to the adoption of these practices. However, as specified in the VCS Standard v4.5 and the VM0042 v1.0 methodology, Boomitra consulted for report in consultation with a regionally renowned domain expert, with the assistance of a locally existing implementing partner, to demonstrate common practice assessment for the additionality. This information was then presented to assess the common practices within the VCS 3340 project.				
Documentation provided by project participant				
Revised PD *Expert opinion*				
DOE assessment				**Date:** 23/08/2024

CAR ID	20	Section no.		Date : 11/08/2024
Description of CAR				

The PP has updated section 3.5 of the PD. The audit team reviewed the revised PD and made the following conclusion-

a) PP has demonstrated that Kenya lacks a legal, policy, or regulatory framework to impose the improved grazing practices. In Kenya, there is no law, statute, or other regulatory framework that applies to grasslands and rangelands mandates the project or its implementation (Mureithi, 2024, REPUBLIC OF KENYA MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES NATIONAL AGRICULTURAL SOIL MANAGEMENT POLICY. (2020). The project's activities are therefore regulatory surplus. The audit team confirms that the project activities are regulatory surplus after reviewing the pertinent local laws and regulations. The finding is closed.

b) Cultural and social barriers in implementing the project activities have been demonstrated in the revised PD. PP pointed out the difficulties in implementing rotational grazing because of societal changes from nomadic to semi-nomadic lifestyles, which cause overgrazing and disagreement to altering traditional grazing practices. Socially, disagreement with culture is crucial since many pastoral communities have a strong cultural legacy and are firmly anchored in traditional grazing practices. They see any move towards rotational grazing as a threat to their traditions and their identity. This environment is made more complex by gender dynamics, as women's restricted ability to make decisions within these communities frequently limits their potential to influence the adoption of novel methods like rotational grazing. The audit team has reviewed the cited secondary literatures to confirm that the cultural and social barriers in implementing the project activities. The finding is closed.

c) PP has incorporated the all the significant barriers identified in consultation with implementing partner on the ground and demonstrated with sufficient evidence. The audit team confirmed it with the literature survey and close the finding.

d) The project boundary has been redefined in the revised PD. Therefore, the demonstration of identified barriers is representative of only Kenya. The audit team reviewed it and closed the finding.

e) The common practice assessment for the additionality has been updated for the redefined project boundary with an expert report. The audit team reviewed the literature cited for the common practice assessment and expert's opinion to confirm that the implemented project activities are not common in the project area. The finding is closed.

CAR ID	21	Section no.		Date : DD/MM/YYYY
Description of CAR				

Issue

1. Insufficient information in Section 4.1 and 4.2 of the PD allow a third-party to reproduce the calculations (or models) to further determine the project's GHG ERRs.
2. It is unclear how Quantification Approach 1 (QA) is fully followed:
    a. Baseline emissions:

i. Section 4.1 of the PD does not describe clearly how the baseline emissions are calculated and demonstrated in the GHG ERR calculation spreadsheet. The PD describes the estimation of baseline ERRs using the Roth-C model, however, this is not reflected in the ERR sheet or in the final ERR numbers.
ii. The baseline emission calculations in the ERR sheet are not in accordance with the QA1, where emissions must be measured and modelled. The baseline emissions are currently derived from literature sources from an area that is not the project area.
iii. Project emissions: QA1 requires both measurement and modelling. However, the project deviates from this approach by not using the biogeochemical model to estimate the change in SOC stock in the project scenario (Sections 3.2 and 4.4.1).

Action Required

1. PP must ensure that Sections 4.1 and 4.2 of the PD provide sufficient information to describe the steps followed to estimate baseline and project emissions more clearly and summarize the annual calculation results based on the different sources of emissions. Further, the PP must ensure that the project includes all relevant sources of GHG emissions as required by the methodology.

2. PP must ensure that the project provides consistent calculations in Sections 4.1 and 4.2 of the PD and the ERR sheets. The project must submit a revised ERR sheet that includes all relevant information to show that the processes of QA1 (measure and model) have been followed for ex-ante estimations. This must include details of all the model (Roth-C) input parameters and uncertainty.

3. PP must ensure that the project appropriately applies QA1 instead of using literature sources in determining the baseline and project emissions. Specifically, Sections 4.1 and 4.2must include the following:
    a. Explanation and justification of the key assumptions and equations, rationale, quantification approach and methodological choices, etc.
    b. An outline of each input data and sources used and demonstrate how each data input meets the approach requirements for each model input category per Tables 6 and 7 of *VM0042, v1.0*. This includes demonstration that soil organic carbon stock and bulk density are either directly measured or estimated via emerging technologies. If using emerging technologies, the project must:
        1. Demonstrate that the primary dataset used to train the remote sensing model is appropriate and comparable with the initial PAIs and how it correlates to the sample units.
        2. List the specific data sources used as inputs to train the remote sensing model.
        3. Describe the specific data sources that will be used for future project activity instances. If data sets for future instances are not yet available, the project must describe the process for obtaining such data and how appropriateness will be ensured.

c. Description of the timing of the input data (e.g., ex-ante or ex-post). Ex-post data/parameters must be included, and the interim sources used for estimations must be stated clearly.
d. Demonstration of the use of the biogeochemical model for the project scenario to follow the selected quantification approach.

4. PP must ensure that Section 4.2 of the PD provides sufficient information for the relevant emissions resulting from the schedule of agricultural management activities in the project boundary. PP must ensure the ATBD report or PD is updated to specify and describe the primary dataset used to train the model.

Program Rule(s)

VM0042, v1.0, Section 8.1 to 8.3

Project participant response	**Date :** 21/08/2024

1. Sections 4.1 and 4.2 of the PD have been updated to provide sufficient information to describe the steps followed to estimate baseline emissions more clearly and the annual calculation results have been summarized based on the various sources of baseline emissions. The PD has been updated with relevant sources of GHG emissions as required by the methodology, the assessment of the same has been provided.
2. The PD and the ER sheets have been updated with the calculations in the sections 4.1 and 4.2. the revised ERR sheet has been submitted, which now includes all the relevant information to show that the processes of QA1 (measure and model) have been followed for ex-ante estimations. This also include details of all the model (Roth-C) input parameters and uncertainty (in section 4.4).
3. A detailed outline of all input data and sources, along with a rigorous demonstration of their alignment with the requirements of Tables 6 and 7 of VM0042, v1.0, is presented in Section 4.1. We have employed a combination of direct measurements and Remote sensing technologies to estimate soil organic carbon stock and bulk density, providing a robust and accurate representation of baseline conditions.

a. Section 4.1 provides a comprehensive explanation of the key assumptions, equations, rationale, quantification approach, and methodological choices underpinning our baseline emissions calculation. We have clearly articulated the logic behind each decision made and the scientific basis for the selected methods.
b. A detailed outline of all input data and sources, along with a rigorous demonstration of their alignment with the requirements of Tables 6 and 7 of VM0042, v1.0, is presented in Section 4.1. We have employed a combination of direct measurements and Remote sensing technologies to estimate soil organic carbon stock and bulk density, providing a robust and accurate representation of baseline conditions.

I. We have meticulously validated the primary dataset used to train the remote sensing model, ensuring its appropriateness and comparability with the initial PAIs. Correlations with sample units have been established to support the model's accuracy.
II. A comprehensive list of data sources used as inputs to train the remote sensing model is included.

III. We have outlined the specific data sources that will be used for future project activity instances. Where data is currently unavailable, we have detailed the data acquisition process and quality assurance measures.

c. Section 4.1 clearly specifies the timing of all input data, distinguishing between ex ante and ex post data. For ex-post data or parameters, we have provided detailed explanations of interim sources used for estimations and the rationale behind their selection.

d. The application of RothC, the biogeochemical model to the project scenario is thoroughly described in Section 4.1. We have demonstrated how the model aligns with the chosen quantification approach and accurately represents the project's carbon dynamics.

4. Section 4.2 of the PD is updated to provide sufficient information for the relevant emissions resulting from the schedule of grassland management activities in the project boundary. The ATBD report and the PD is updated to specify and describe the primary dataset used to train the model.

Documentation provided by project participant

Updated PD

ERR sheets

DOE assessment	**Date:** 28/08/2024

1. The PP revised sections 4.1 and 4.2 of the PD to provide information to describe the steps followed to estimate baseline and project emissions. Note that the requirement to summarize the annual calculation results based on the different sources of emissions has not been adequately addressed in the current PD. Therefore, PP is requested to provide the required revisions in the PD.
2. The VVB has reviewed the updated materials and noted that further assessment of the ERR for baseline and project scenarios will be provided once the necessary actions are addressed.
    - Upon reviewing the Kenya_Grassland_RothC_Validation_Report_Data_ACTIVE.xlsx for MVR, it was noted that none of the Baseline Literature Data by Sample originates directly from the project site. To ensure the validity and applicability of this data, the Project Proponent (PP) is requested to clarify the following points:
        i. Climatic, Topographical, and Ecological Similarity: Please provide a detailed explanation of how the climatic, topographical, and ecological characteristics of the locations referenced in the literature are similar to those of the project site. This information is crucial to justify the use of data from these sources in establishing the baseline.
        ii. Appropriateness and Conservativeness of Baseline Data: Clarify how the baseline data derived from the sourced literature is both appropriate and conservative when applied to the project site. It is important to demonstrate that the selected baseline accurately reflects the conditions at the project site and does not overestimate potential benefits.
        iii. Use of Historical Data: Given that the practice end date for most of the papers is 2006, please explain how the use of these historical values is still relevant and applicable to the current project conditions. It is essential to

ensure that the data remains valid and reflective of the project's present-day context.

- The Project Proponent (PP) is requested to clarify the use of the DPM:RPM ratio of 0.67, which is the default value for unimproved grassland. It has been noted that the Project Description (PD) does not specifically categorize the grassland as unimproved. To ensure consistency, please address the following:
  i. Justification for the Default Ratio: Explain the rationale behind using the DPM:RPM ratio of 0.67, given that the PD does not classify the grassland as unimproved in its description.
  ii. Grassland Classification: Confirm whether the grasslands in the project should be considered unimproved. If so, please update the PD accordingly. If not, explain why the unimproved grassland ratio is still applicable.

  Similar issues with improper citation have been identified in the MVR, which could potentially impact the calibration process of the model. For instance, the PP used Pineiro 2009 to address uncertainties; however, this reference pertains to South America rather than the project region, which is Kenya. Therefore, the PP is requested to review the paper thoroughly and revise the MVR accordingly for assessment along with supporting evidences. Please NOTE that further assessment for MVR shall be done post clarifications and revisions.

3. The current project document does not meet the QA1 requirements as it fails to provide the necessary details regarding the data sources for the remote sensing model and future project activities. Including this information is essential to ensure transparency, accuracy, and adherence to the methodological requirements outlined in Tables 6 and 7 of VM0042, v1.0.
   - Specific Data Sources for Remote Sensing Model Training: The document lacks a detailed list of the specific data sources used to train the remote sensing model. Therefore PP is requested to clearly list all specific data sources used in training the remote sensing model. This should include all relevant details that demonstrate the sources' appropriateness and relevance.
   - Data Sources for Future Project Activity Instances: The document does not describe the specific data sources that will be used for future project activity instances. Additionally, if the data sets for future instances are not yet available, the process for obtaining such data and ensuring its appropriateness is not outlined. Therefor PP is requested to make necessary revisions as required.
4. PP is requested to revise Section 4.2 to include detailed information on the emissions from agricultural management activities and update PD to explicitly specify and describe the primary dataset used for training the remote sensing model, including its relevance and appropriateness. ATBD document shall be reviewed post these revisions.

Therefore CAR#21 remains open.

Project participant response	**Date :** DD/MM/YYYY

1. The annual calculation results for baseline and project scenarios are added to Table 19 in Section 4.5.3, with notes below the table giving further description.

2.

1.i The comparison between literature and project sites has been added to the MVR.

1.ii Appropriateness and Conservativeness of Baseline Data: The average baseline carbon change in the literature samples is +0.17 tons/ha/yr compared to a highly conservative +0.36 tons/ha/yr in the project. This information has been added to the PD Section 4.2.

1.iii A discussion of the long grazing history in Kenya has been added to the Model Implementation and Calibration section of the MVR, with thousands of years of livestock grazing history, and a continuous history of modern overgrazing since the mid 1900s. The

validation studies are relevant as they are within this modern practice time-frame, and occur in regions with similar long histories of grazing.

2.i The FAO definition for improved and unimproved grasslands has been added to the Model Implementation and Calibration section of the MVR. All sites currently in the project are in the unimproved category.

2.ii The comparison between literature and project sites has been added to the MVR.

3. a. The soil sample dataset sources are described in Section 4.1. The comparison between soil ground-truth data and project sites, for applicability, has been added to Section 4.1: Figures 23-24 and Tables 14-15. The satellite data sources used to train the model are listed in Section 4.1 (1st paragraph of page 114, at the time of this comment). The appropriateness of the satellite data sources and the theoretical framework for measuring soil organic carbon via remote sensing are detailed in the ATBD document supplied to the VVB and Verra at the time of validation.

b. Section 4.1 has been updated to address the applicability of training data for the remote sensing algorithm as detailed in 3a above.

4. Section 4 has been revised with maps and tables describing the management activity emissions and appropriateness of the remote sensing training data with respect to strata within the project.

Documentation provided by project participant

Updated Model Validation Report

Updated ATBD Document

DOE assessment	**Date :** 22/10/2024

1. The section is inconsistent and could not be found in PD. Additionally PP is requested to clarify how are some emissions considered as zero. Further assessment is subject to these clarifications.
2. PP is requested to refer to comment in MVR. Additionally similar issues with improper citation have been identified in the MVR as previously discussed is still open, which could potentially impact the calibration process of the model. For instance, the PP used Pineiro 2009 to address uncertainties; however, this reference pertains to South America rather than the project region, which is Kenya. Therefore, the PP is requested to review the paper thoroughly and revise the MVR accordingly for assessment along with supporting evidence. Please NOTE that further assessment for MVR shall be done post clarifications and revisions.
3. Figure 23-24 could not be found in the referenced section of PD. Additionally Tables 14-15 could not be found in the referenced section.
4. The revisions require detailed explanation in the ATBD document with consistent citation in PD and ATBD document.

Project participant response	**Date :** DD/MM/YYYY

1. The correct reference has been fixed to reflect that Table 19 is in section 4.5.1 of the PD. Additionally, further explanation around the “emissions considered zero” in Table 19 has been responded to in the PP’s response to CAR 26 in this Audit Findings document.
2. The section “Validation Data Sources” in the MVR has been updated to include a section on the search and selection process for peer-reviewed studies used in model validation, including Pineiro 2009. The VVB has not supplied the referenced MVR with comments, so those comments are not addressed at this time.
3. References in the revised version of PD have been updated to correctly refer to figures 23-24 and tables 14-15, which can be found in section 4.1 of the PD.

4. Section 5.1 of the ATBD has been revised and updated to be consistent with the previous revisions and explanation included in section 4 of the PD. The ATBD and PD now have consistent detailed explanations on this topic.
Documentation provided by project participant
Updated ATBD document Updated PDD

DOE assessment	**Date :** 28/10/2024
1. Noted. The table has been revised in the PD and is consistent however, the validation of the estimates are contigent on closure of CAR#21 pointer 2 for VVB Assessment dated 28/08/2024. 2. The submitted excel file exhibits inconsistencies in its naming conventions as referenced in the validation data sources section of MVR, and the revised file lacks updates that would address the clarification request regarding similarity with referenced literature, particularly in terms of climate, soil, topography, and ecological sensitivity relative to the project region. This point remains unaddressed from the previous assessment and does not necessitate comments in the MVR. Moreover, upon review of the "Baseline literature" worksheet in Kenya_Grassland_RothC_Validation_Report_Data_v1.xlsx, it appears that the selected baseline literature does not closely match the project's climate characteristics. The majority of references originate from South America, specifically within Warm Temperate Dry and Tropical Moist climate zones, which do not align with the Tropical Dry and Tropical Montane climates identified for the project area in Figure 1 of the MVR. While small regions of Kenya do fall within Warm Temperate Moist and Warm Temperate Dry climates, this does not necessarily apply to the project area, and PP is welcome to substantiate any such relevance with supporting raster data if applicable. Additionally, details on soil type, vegetation/ecological conditions, and topography are either not fully covered in the MVR or previously discussed responses. In the "Improved literature" section, while Kenya is noted within a Tropical Montane context, a preliminary review indicates that the majority of the literature remains climate-wise dissimilar to the project region. To ensure robustness, PP is requested to provide further literature that aligns more closely with the project's ecological context or to clarify existing selections. A more comprehensive assessment of the worksheet will follow once these clarifications are available. 3. 4.	

Project participant response	**Date :** 28/10/2024
2. VMD0053v1 requires that the validation data match the project crop (perennial grasses), IPCC climate zones, soil textures, and range of clay percentage, and PPs are encouraged to broaden the scope of these parameters to improve generalization. The project meets these criteria with exception of validation samples for the baseline scenario in the Tropical Montane IPCC climate zone, as noted in the VVB assessment #2 above. Despite over a month of research by two soil scientists, no peer reviewed papers were found for this requirement. Here we follow from VMD0053v1 Section 5.2.3, Requirement 2: *"If the available data fail to meet one of these minimums due to data scarcity, or fails while also exceeding the others in a way that supports a demonstrable test of generalized model performance, a case may be made for a valid exception to Requirement 2"*, where the validation set contains 4 soil textures, 4 climate zones, and >30% span in clay content, thus exceeding requirements in more than one area. In addition, we show that the project site climatology is much more similar to the validation	

	data than the parameter ranges allowed in the climate zone definitions. All ranches in the first instance of the project are in the Tropical Montane IPCC climate zone, but the project-site mean annual temperatures are less than 1°C above the 18°C threshold for Warm Temperate zones, and the project sites are well represented by the validation. The following has been added to the Model Validation Report: • A detailed discussion of climatology and elevation matching between validation sites and project sites (pg 5), • Climate and elevation parameters for baseline and improved validation sites, and project sites (Tables 2, 4, and 5) • These climate parameters were also added to the accompanying Model Validation Spreadsheet • The IPCC climate zone methodology was added to the Model Validation Report for reference, Figure 2 *40)*
Documentation provided by project participant	
Updated Draft Model Validation Report Updated Draft Model Validation Report Spreadsheet	
DOE assessment	**Date :** 30/10/2024
The Project Proponent (PP) in the Draft Model Validation Report (MVR) detailed the selection process for validation datasets used in both baseline emissions modeling and project-improved emissions modeling, adhering to the guidelines specified in VMD 0053 (Section 5.2). Initially, an extensive search was conducted for peer-reviewed studies conducted within Kenya that met these requirements. However, despite diligent efforts, the PP found no suitable studies within the project area. To address this data scarcity, the search was expanded to include studies from locations that fall within the four IPCC climate zones relevant to the project domain. Consequently, many selected studies, such as those by Piñeiro et al. (2009), were sourced from areas outside Kenya but remain pertinent due to their alignment with the project's climatic context. All project ranches are categorized under the tropical montane IPCC climate zone (2019 revision). While no peer-reviewed studies specific to baseline practices in this environment were identified, the PP noted that several warm temperate dry studies closely resemble the project site conditions and effectively represent the climatology of the area. Following VMD 0053 (Section 5.2.3, Requirement 2), it is acknowledged that exceptions may be made when data scarcity restricts access to suitable studies, provided that the available data still support a demonstrable test of generalized model performance. Conversely, the VVB identified multiple relevant studies, including the comprehensive work by Tessema et al. (2020), which documented over 15 papers pertaining to grassland ecosystems in Kenya and neighboring regions. These studies exhibit profiles similar to those discussed by the PP. The VVB assessed these papers and found them relevant to the project's context. To ensure the validity of the PP's claims, it is requested that the PP provide a demonstration of the specific studies referenced in their assessment, particularly those they deemed unsuitable for the region. Additionally, clarification on how the papers identified by Tessema et al. (2020) might not be relevant would be beneficial. This collaborative approach will help enhance the robustness of the modeling and validation processes.	

TABLE 1 Documentation of the literature search using Google Scholar, December 7–9, 2017

Search ID	Search string	Time period restriction	Hits (#)	Subset 1 (#)	Subset 2 (#)	Subset 3 (#)
1	Ethiopia AND "soil organic carbon" AND grasslands	---	13,500	16	14	3
2	Kenya AND "soil organic carbon" AND grasslands	---	17,300	19	15	6
3	Tanzania AND "soil organic carbon" AND grasslands	---	10,900	12	11	3
4	Uganda AND "soil organic carbon" AND grasslands	---	7,430	17	11	4
5	Rwanda AND "soil organic carbon" AND grasslands	---	2,950	13	13	4
6	Burundi AND "soil organic carbon" AND grasslands	---	1,430	5	5	3
7	Ethiopia AND "soil organic carbon" AND grasslands	Since 2007	8,960	25	24	9
8	Kenya AND "soil organic carbon" AND grasslands	Since 2007	12,000	17	17	5
9	Tanzania AND "soil organic carbon" AND grasslands	Since 2007	6,750	13	13	5
10	Uganda AND "soil organic carbon" AND grasslands	Since 2007	4,480	14	14	5
11	Rwanda AND "soil organic carbon" AND grasslands	Since 2007	1,710	10	10	4
12	Burundi AND "soil organic carbon" AND grasslands	Since 2007	936	9	8	1
1–12	No. after removal of duplicates	30				
1–12	No. after removal of studies presenting insufficient information for the Excel table	23				

= number of publications. --- = no restriction

Please refer to the commented MVR for each individual pointer as open issue.

Additionally, the geolocation provided in the excel file contains geolocation of some of the samples used as sample but the same geolocation i.e. geo coordinates could not be found in paper or as supplementary data by author at publisher's website. PP is requested to clarify and substantiate the same, this also further will require confirming the data sources used.

Project participant response	**Date :** DD/MM/YYYY

The PP has included a document outlining in detail the papers suggested by the VVB as well as additional papers and the reasons that they are not usable due to lacking at least one piece of the specific data required for running RothC with our required input data. The detailed explanatory document as well as pdf copies of each paper have been provided to VVB in the kenya_grasslands_validation_papers folders.

The individual comments in the MVR have been addressed and updates and explanations can be found in the MVR document. A summary of the changes:

1. List of soil texture classes and associated clay contents in the project domain: a detailed description of the technique for extracting clay contents was added to the MVR to the "Model Inputs" section. In addition, an example script and all Soilgrids rasters used to produce the clay content results was provided in kenya_soilgrids_sampling_demo directory.
2. The sheet "Literature_Site_Selection_Notes" has been added to the MVR Spreadsheet with specific details about how sites, treatments, and values were extracted from each of the literature validation studies. Details about geolocating the literature validation studies is also included in this sheet.
3. The sheet "Project_site_data" has been added to the MVR spreadsheet with specific details about the relationship between project sites and validation literature, as they pertain to requirements described in VMD 0053 V1.0.

4. Without changing any data, the citation and sample identifier for “Pailan 2007” was corrected to “Mahanta 2013” in the MVR and MVR spreadsheet. The data remains completely unchanged, and therefore the change has no impact on the model fitting or predictions. The Mahanta 2013 paper contains all data used in the MVR, and had referenced the Pailan 2007 data as the source.
5. The PDFs for all papers used in model validation were provided.
6. The IPCC climate zone raster and accompanying legend were provided.
7. The pan evaporation climatology was added to the MVR and MVR spreadsheet. An example of how data is pulled and averaged from SoilGrids has been added to the MVR section "Model Inputs" (page 17-18, currently)
8. Example python code for pulling data from SoilGrids, and for calculating soil texture, have been added to the MVR/kenya_soilgrids_sampling_demo/ directory. In the same directory are example geotiffs pulled with that code (also see example on page 17-18 of the MVR)
9. A review of relevant peer-reviewed papers for validation is given in the MVR/kenya_grazing_literature_search/ directory along with PDFs of each paper.
10. For convenience, the PDFs for each validation paper used in the MVR is now attached in the MVR/MVR_literature_pdfs/ directory.
11. The method for determining the location of validation sites from the literature is now given in the first paragraph of the MVR section Validation Data Sources.

41)

Documentation provided by project participant

DOE assessment	**Date :** DD/MM/YYYY

Based on the Project Proponent's (PP) response and the supplemental documentation provided, the finding has been reviewed and assessed. The PP has addressed the initial concerns comprehensively by incorporating detailed explanations, corrections, and additional supporting documentation in the Draft Model Validation Report (MVR) and accompanying files.

Key updates and assessments are summarized below:

1. **Literature Validation Studies**
   - The PP provided a detailed explanatory document outlining the selection process for validation datasets and specific reasons why the studies suggested by the VVB were deemed unsuitable for RothC modeling. The VVB requested evidence to support the claim that no suitable peer-reviewed literature was found for the baseline scenario in the Tropical Montane climate zone, with only one paper identified for improved practices in this region. While it cannot be guaranteed that no other relevant papers exist, the analysis of the most relevant paper and the reasons for its exclusion from validation are provided. A comprehensive search was conducted by PP using Google Scholar, with the following criteria for selecting literature: multiple time points, identifiable locations for soil and climate data, relevant management history, and carbon data. Only peer-reviewed papers were considered.

     The PDFs for each paper reviewed are available in the Kenya_grazing_paper_search_pdfs/ directory.

     Key Excluded Papers:
     - **Girmay et al. 2008**: Lacked required information on starting carbon values, location, and dates.
     - **Tessema 2011**: Single time-point analysis, unclear SOC sequestration rates.

- **Svanlund 2014**: Snapshot of SOC at one point in time, missing starting values.
- **Dabasso 2014**: Single-time point measurement with no change over time.
- **Rotich 2018 & 2020**: Single time-point data with no validation of carbon change.
- **Wachiye 2020**: Focused on CO2 gas flux, not soil carbon.

The search used terms like "Kenya soil carbon grazing" and "Kenya grazing RothC." Papers from Kamoni (2007) and Geremew (2023, 2024) were also reviewed but did not meet the validation criteria due to a lack of rangeland data or unsuitable land use changes. The reasons for excluding these papers are documented, and the full list of reviewed papers was provided by PP.

- The "Literature_Site_Selection_Notes" sheet in the updated MVR spreadsheet details the inclusion and exclusion criteria for each study, ensuring transparency in the validation process. The geolocation of validation papers was determined through a structured approach. Where latitude and longitude were provided, coordinates were converted to decimal degrees. For locations without coordinates, nearby areas visually matching the project type (e.g., grazing, cropping) were selected. For studies aggregating multiple sites, approximate central coordinates were used, with detailed notes in the project documentation. The geolocations were utilized to assign climate zones, access weather data, and retrieve SoilGrids data, as outlined in the "Model Inputs" section of the MVR. Key literature references include studies like *Franzluebbers 2009*, *Chan 2011*, and *Allen 2013*, where SOC stock values were derived using averages, back-calculations, or space-for-time proxies. Regional studies such as *Alvarez 2020* used aggregated results, with geolocations representing approximate averages. All geolocation methods, including assumptions, are transparently documented to ensure alignment with modeling and validation requirements. This approach adequately supports the validation and monitoring processes while meeting the methodology's & tool requirements.
- PDFs of all papers reviewed during the selection process, including those used and excluded, have been provided by PP in the kenya_grazing_literature_search directory, enabling assessment and conclusion.

2. **Geolocation and Data Sources**
   - The PP clarified the methodology for geolocating sites from literature studies, which is now detailed in the MVR under the "Validation Data Sources" section. The Project Proponent (PP) clarified the methodology for geolocating sites from literature studies, and this has been detailed in the Monitoring and Verification Report (MVR) under the "Validation Data Sources" section. Specifically, the first Project Area Instance (PAI) falls within the Tropical Montane climate zone, for which **Ambaw et al., 2020** can be used as a reference. However, the majority of the project area falls under a different climatic zone, referred to as the "other climate zone" in the baseline literature. Upon review, the VVB acknowledges that the baseline literature does not provide specific references for the Tropical Montane climate zone. However, the VVB agrees with the PP's assertion that there are significant similarities between the Tropical Montane sites and those in other climatic zones, such as the Warm Temperate Dry zone. Despite being classified under different zones by the IPCC system, the characteristics of the project sites—such as land use, soil types, and agricultural practices—are sufficiently similar to those of validation sites in the other zones. These justifications are further elaborated in the "Validation Data Sources" section of the MVR, where the rationale for applying the selected references is provided in detail. This approach helps to generalize the model and broaden its

applicability across different climatic zones which is allowed under requirement 2 of VMD0053 V1.0. However, it is important to note that this will be verified during the project's verification stage or at the time of including the second Project Area Instance (PAI), ensuring that the methodology and assumptions remain consistent and valid as the project progresses.
    - Discrepancies in geolocation were addressed by providing supplementary data and example geotiffs generated using SoilGrids, which were validated against the MVR spreadsheet.
    - The updated sheet "Project_site_data" in the MVR spreadsheet demonstrates how project sites align with literature validation studies, adhering to VMD0053 requirements.
3. **Technical Clarifications and Model Inputs**
    - A detailed description of soil texture class extraction and clay content determination has been added, supported by an example script and relevant SoilGrids rasters provided in the kenya_soilgrids_sampling_demo directory. The values were found to be in range of applicability of the tool requirement 2 of VMD0053.
4. **Supplementary Files and Python Code**
    - The PP has shared the IPCC climate zone raster, pan evaporation climatology, and example Python scripts for data extraction and processing, demonstrating the replicability and validity of their approach.
5. **Validation of Files Provided**
    - The directories kenya_grazing_literature_search and MVR_literature_pdfs were reviewed to confirm that all referenced PDFs are included and accessible.
    - The "Model Inputs" section in the updated MVR (pages 17–18) and the example Python code provided were assessed for alignment with the described methodology.

Conclusion
The PP has adequately addressed the issues raised in the finding by providing extensive clarification, corrections, and substantiating documentation. The updates are consistent with the requirements outlined in VMD 0053 (Section 5.2.3). Based on the assessment of the revised MVR and associated files, the finding is considered resolved and closed.

CAR ID	22	**Section no.**		**Date :** DD/MM/YYYY

Description of CAR

Issue

1. The project description does not clearly describe the sources of uncertainty and how the uncertainty is calculated.
    a. The GHG ERR calculation sheets do not provide the uncertainty calculations.
    b. It is unclear whether the error of the SOC stock estimates is propagated through the remote sensing-based modelling and the biogeochemical modelling when estimating uncertainty.
2. The remote sensing model's uncertainty has not been demonstrated.
    a. It is unclear how bulk density is estimated accurately. In particular:
        i. Section 4.1 of the PD states that bulk density and SOC for t=0 will be measured at a depth of ~30cm with remote sensing technology, which is inconsistent with the description in the ATBD report that bulk density will be estimated with pedotransfer functions and then, SOC stocks will be modelled.
        ii. The supplementary ATBD report has not sufficiently demonstrated the accuracy of the determined soil bulk density through remote sensing, and the

project description has not discussed the uncertainty of the soil data that are collected through remote sensing.

iii. The VVB has not provided sufficient assessment regarding the appropriateness of the soil bulk density value. Furthermore, the VVB has not demonstrated a reasonable level of assurance that the soil analysis at t=0 using remote sensing is appropriate.

b. There is insufficient detail on the number of samples used to train the remote sensing model.
c. It is unclear if the uncertainty/error of the samples on which the machine learning model is based is known and accounted for in the calibration of the model.
d. It is unclear if all samples used to test the remote sensing model used the same sampling and measurement approach.
e. It is unclear if the project has done any ground truthing to confirm the model validation, as described in Section 4.2.5 of the model report.
f. The report discusses how uncertainty can be assessed, but the actual estimation of uncertainty as required by the meth is missing in the report and PD.
g. The uncertainty of machine learning has not been demonstrated in the project description and assessed in the validation report.

i. According to FAR 02 the VVB has stated that the efficacy of measuring SOC through remote sensing is not well established. Considering this, a comparison between remote sensing SOC values and direct field and lab measurements is missing.

3. The uncertainty of using the RothC model has not been demonstrated. Section 4.1 of the PD describes the list of input data for the RothC model. However, the uncertainty of these data has not been discussed in Section 4.3.1 considering:
   a. Most of the data are collected from external sources, and the uncertainty of these data has not been discussed.
   b. Most of the data are based on general data that are not specific to the project area, and the project has not discussed how general data can be scaled down for the project area.
   c. The uncertainty and the variability of those data have not been discussed.
   d. The project uses a single SOC value for each instance, averaged across the landholding. However, it is unclear how many samples are considered to estimate the SOC content and what is the uncertainty of the applied value.
4. The validation report has not provided sufficient assessment on uncertainty.

Action Required

1. PP must ensure that Section 4.3.1 of the project description provides sufficient information identifying the sources of uncertainty, the description of the approach to calculate the error propagation, and the final overall uncertainty of the calculations. Quantification approach 1 must be followed to address and calculate the uncertainty appropriately. Section 4.4.1 must demonstrate that the error of the SOC stock estimates is propagated through the remote sensing-based modelling and the biogeochemical modelling (i.e., RothC) when estimating uncertainty. The GHG ERR spreadsheet and relevant quantification sections in the project description must be updated as needed.

a. Remote Sensing Model:

i. Provide a consistent (i.e., same with ATBD report) description of how bulk density is measured and estimated,
ii. Demonstrate the accuracy. appropriateness, and uncertainty of the remote sensing approach.
iii. Demonstrate the accuracy, appropriateness, and uncertainty of soil data collected through remote sensing.
iv. Demonstrate the accuracy, appropriateness, and uncertainty of the machine learning model.

b. RothC model:

i. Demonstrate the accuracy, appropriateness, and uncertainty of the RothC model.
ii. Demonstrate the appropriateness and the uncertainty of the applied external data having the appropriate values for the project area and how the project shall ensure that the data that are applied are accurate.
iii. Provide a supporting sheet with clear details of all model inputs used to model ex-ante SOC in the baseline and project scenario with their sources and uncertainty (See Finding 10.)

2. PP must ensure that the project description discusses the error range of the applied models to estimate the SOC increase. The measures that will be taken to address this uncertainty must be described.
3. PP must ensure that the project has addressed all matters pertaining to FAR 02 in the current validation.

Program Rule(s)

VM0042, v1.0, Section 8.6 and 8.6.1

Background:

- The validation report has stated that the VVB cannot provide a final conclusion that the monitoring of SOC through remote sensing is accurate. Based on FAR 02, the project must use another approach besides remote sensing to monitor the SOC and other soil properties. Considering that the issues in FAR 02 are relevant for the accuracy of the estimated GHG ERR, monitoring plan, and the quality of the data that are collected, FAR 02 must be addressed as CL/CAR for the current validation.
- The remote sensing approach described has not been peer-reviewed.
- VM0042, v1.0 states that emerging technologies (e.g., remote sensing) can only be used with known uncertainty and must be used in both the baseline and with-project scenario for the length of the project. For more guidance, the VVB and project proponent may refer to Appendix 1 of VM0042, v2.0, if appropriate.
- The project uses Quantification Approach 1, measure and model, to quantify SOC stock changes over time. The SOC stock and bulk density input is determined by remote sensing. Thus, when calculating uncertainty, the project must account for the error from remote sensing (i.e., the remote sensing model) by propagating it into the biogeochemical model (i.e., RothC).

Project participant response	**Date :** 21/08/2024

Section 4.4 has been updated to provide sufficient information identifying the sources of uncertainty, the description of the approach to calculate the error propagation, and the final overall uncertainty of the calculations. We have updated our ER sheet to explicitly work through Quantification approach 1 must address and calculate the uncertainty appropriately. A spreadsheet giving an end-to-end example of emissions reduction and uncertainty calculation for one ranch has been added in addition to the updated ER sheet (*full end-to-end calculations for one farm Kenya GL.xlsx*). Section 4.4.1 has been updated to show how the error of the SOC stock estimates is propagated through the remote sensing-based modelling and the biogeochemical modelling (i.e., RothC) when estimating uncertainty.

a. Remote Sensing Model:
    i. Provides a consistent (i.e., same with ATBD report) description of how bulk density is measured and estimated,
    ii. Section 4.4 has been updated to demonstrate the accuracy., appropriateness, and uncertainty of the remote sensing approach.
    iii. Section 4.4 has been updated to address the uncertainty of soil data collected through remote sensing.
    iv. Section 4.2 and 4.4 have been updated to demonstrate the accuracy, appropriateness, and uncertainty of the machine learning model.
b. RothC model:
    i. Section 4.2 and 4.4 has been updated to address the accuracy, appropriateness and uncertainty of the RothC model.
    ii. The section also addresses the methods of sampling and the appropriateness of the data for the project region.
    iii. Section 4.1 and 4.2 have been updated to include all relevant inputs to the RothC model.

2. Section 4.4 of the PD discusses the error range of the applied models to estimate the SOC increase as well as the measures that will be taken to address this uncertainty.
3. The project has addressed all matters pertaining to FAR 02 in the current validation (see FAR response at the end of this document).

Documentation provided by project participant

Updated PD

Draft Model Validation Report

Updated ER sheet

End-to-end emissions and uncertainty example spreadsheet

DOE assessment	**Date:** 27/08/2024

1. The revised PD does not adequately address the required revisions outlined for the following sections:
    a. Section 4.3.1: The PPD lacks sufficient information on identifying sources of uncertainty, the approach for calculating error propagation.
    b. Section 4.4.1: The document fails to demonstrate how error in SOC stock estimates is propagated through both the remote sensing-based modeling and the biogeochemical modeling (RothC). Only the approach of reduction of error is provided its propagation is nit discussed.

c. Remote Sensing Model:
   - The description of bulk density measurement and estimation is not found in the relevant section of the PD.
   - There is insufficient demonstration of the accuracy, appropriateness, and uncertainty of the remote sensing approach, soil data collected through remote sensing, and the machine learning model.

d. RothC Model: The accuracy, appropriateness, and uncertainty of the RothC model are not adequately demonstrated. The document does not address the appropriateness and uncertainty of the external data applied, nor does it detail how the project will ensure data accuracy.

NOTE: The ERR sheet shall be reviewed post these revisions.

2. The revised PD has not sufficiently addressed several critical aspects related to the demonstration of uncertainty (please note that the following findings are pertinent to the relevant section as discussed above):
   a. Remote Sensing Model:
      - The estimation of bulk density remains unclear and inconsistent between the PD section and as described in ATBD report.
      - The accuracy and uncertainty of soil bulk density determined through remote sensing are not adequately demonstrated in previous version of ATBD. The corresponding section describes only the process of reduction. The revised ATBD document is not provided in evidences by PP.
      - The number of samples used to train the remote sensing model and whether the uncertainty/error of these samples is accounted for in the model calibration is not detailed in the PD
      - It is unclear whether all samples used to test the remote sensing model utilized the same sampling and measurement approach, and there is no confirmation of ground truthing for model validation described in PD/ model report.
      - The report discusses methods to assess uncertainty but fails to provide the actual estimation of uncertainty as required by the methodology.
      - The uncertainty of the machine learning approach has also not been demonstrated in the PD
   b. RothC Model: The uncertainty of input data, particularly those collected from external sources or based on general data not specific to the project area, has not been discussed. The variability of these data and the uncertainty of the applied SOC values, which are averaged across the landholding, have not been addressed.

   Furthermore, the PD is not provided with revised ATBD document to support these revisions, leaving significant gaps in the demonstration and assessment of uncertainty.

3. FAR#02 has not been fully addressed. PP is requested to provide clarification of its addressal with supporting evidences.

Therefore CAR#22 is open.

Project participant response	**Date:** DD/MM/YYYY

1. Addressed Below
   a. Section 4.3 has been revised with additional discussion of uncertainty, and the included end-to-end spreadsheet shows the propagation of uncertainty used to calculate uncertainty deductions and emissions reductions.
   b. The Section 4.1 has been updated with additional discussion of PPD uncertainty, and the full propagation of the SOC stock uncertainty through the RothC model is demonstrated in the end-to-end spreadsheet

i. Section 4.4.1 has been updated to include a specific description of the derivation of the pedotransfer function methodology for deriving bulk density.
ii. The end-to-end spreadsheet shows how SOC and bulk density uncertainty are propagated through the RothC model.

c. *Sections "Model Inputs" and "Model Validation" in the Model Validation Report draft have been updated to include additional explanation of the uncertainty and appropriateness of the RothC model and associated external data.*

2. Addressed Below
   a. The full bulk density PPD analysis and propagation through the RothC model is now given in the end-to-end spreadsheet. The number of samples used to train the remote sensing model is now given in the ATBD and section 4.1 of the PD.
   b. Section 4.4.1 has been updated to include a more specific description of the derivation of the pedotransfer function methodology for deriving bulk density, referencing the specific methodology derived in the ATBD.
   c. Figure 12 of Section 5.1 of the ATBD includes a measurement of the accuracy and uncertainty of the bulk density pedotransfer function. The revised ATBD with these sections will be provided to the VVB.
      i. Section 4.1 of the PD now includes the number of samples used to train the remote sensing model, which is 616 data points. Additionally, section 4.1 of the PD now includes references to section 5.1 of the ATBD which deals with the calibration samples and their associated error in greater detail.
      ii. Section 4.1 of the PD has been updated to now include additional clarity on the sampling and measurement approach for all ground-truth samples used in training/calibrating the remote sensing model, with additional reference to the ATBD.
      iii. The PD now contains the estimation of uncertainty in Section 4.4.1.2 as derived by using a Bayesian approach using Monte Carlo simulations of the output of the remote sensing machine learning model.
      iv. The PD now contains a description of the methods used to determine the uncertainty of the machine learning approach in Section 4.4, Section 4.4.1, Section 4.4.1.2, and Section 4.5.1. This uncertainty is calculated via the repeated training of the remote sensing machine learning model to create a posterior distribution of the model's internal parameters that accounts for the modeling error and the input data noise. Taking the variance of this distribution
      v. provides an accurate calculation of the uncertainty in the SOC stock and may be used directly as the uncertainty of SOC stock for the sample unit.
3. The FAR response is given at the end of this document

Documentation provided by project participant

full end-to-end calculations for one farm Kenya GL Excel sheet

Updated ATBD document

Revised PDD

DOE assessment	**Date:** 22/10/2024

1.
   a. Section 4.3 has been revised to include an expanded discussion on uncertainty, and the end-to-end spreadsheet, which demonstrates the propagation of uncertainty used to calculate uncertainty deductions and emissions reductions, has been reviewed by the VVB.
   b. Section 4.4.1 does not provide a clear description of how the error in SOC (Soil Organic Carbon) stock estimates is propagated through both the remote sensing-based modeling and the biogeochemical modeling (RothC). While the approach to error reduction is mentioned, the propagation of error, particularly in relation to the

biogeochemical cycle, has not been sufficiently discussed. To address this, a more detailed explanation of how error is managed throughout both modeling processes is required.

c. RothC Model: The accuracy, appropriateness, and uncertainty of the RothC model are not adequately demonstrated. The document does not address the appropriateness and uncertainty of the external data applied, nor does it detail how the project will ensure data accuracy.

2.

a. The full bulk density PPD analysis and its propagation through the RothC model, as well as the number of samples used to train the remote sensing model, which are stated to be included in the end-to-end spreadsheet, the ATBD, and Section 4.1 of the PD, could not be found in the PD during the Validation/Verification Body (VVb) review.
b. While Section 4.4.1 has been updated to include a description of the derivation of the pedotransfer function methodology for calculating bulk density, the explanation remains unclear and is not properly referenced to the ATBD document. A more explicit definition of the methodology and accurate referencing to the relevant sections of the ATBD are needed to ensure transparency and traceability. Figure 12 of Section 5.1 of the ATBD includes a measurement of the accuracy and uncertainty of the bulk density pedotransfer function. The revised ATBD with these sections will be provided to the VVB.
c. The revisions in Section 4.1 of the PD, including the inclusion of 616 data points used to train the remote sensing model and references to Section 5.1 of the ATBD, are well noted. However, the detailed explanation of the associated error, as referenced, could not be found in the provided documents. Further clarification on the treatment of associated error is required to address this finding.
d. While Section 4.1 of the PD has been updated to provide additional clarity on the sampling and measurement approach for all ground-truth samples used in training and calibrating the remote sensing model, the corresponding changes and references in the ATBD could not be found. Further revisions and clear alignment with the ATBD are needed to fully address this finding.
e. The estimation of uncertainty provided in Section 4.4.1.2 of the PD, which utilizes a Bayesian approach with Monte Carlo simulations to analyze the output of the remote sensing machine learning model, has been satisfactorily included. This finding is considered closed.
f. The PD now provides a comprehensive description of the methods used to determine the uncertainty of the machine learning approach in Sections 4.4, 4.4.1, 4.4.1.2, and 4.5.1. The uncertainty is calculated through repeated training of the remote sensing machine learning model, creating a posterior distribution of the model's internal parameters that accounts for both modeling error and input data noise. This finding is considered closed.

3. While the Forward Action Request (FAR) response is provided at the end of the document, the Project Proponent (PP) is requested to incorporate the necessary changes into the relevant sections of the Project Description (PD). This will ensure consistency and proper documentation of the updates within the PD itself.

Project participant response	**Date :** 25/10/2024

1. Blank
   a. Closed
   b. Section 4.4 of the PD explicitly outlines the methods used for the propagation of uncertainty throughout the RothC results. The approach of these methods for Boomitra's remote sensing technologies is introduced in Section 4.4.1 of the PD. Section 4.4.1.1 of the PD outlines every source of uncertainty in both the remote sensing and RothC models. An example of the uncertainty calculations is presented in section 4.4.1.2 of the PD, displaying the effects of the input uncertainty on the results

produced from the remote sensing and RothC model. Additionally, paragraphs have been added to Section 4.4 of the PD "Model Input Measurement Error", Section 4.4.1.1 of the PD, and Section 5.1.1 of the ATBD to further clarify the derivation of uncertainty by thorough sampling of the input error distribution with Bayesian error analysis.

c. The accuracy of the RothC model is fully demonstrated in the MVR document section titled "Model Validation". This information can also be fonud in the MVR spreadsheet.

The appropriateness of the data applied is detailed in the MVR document sections titled "Model Inputs" and "Validation Data Sources".

The uncertainty of the RothC model is demonstrated in the PD Section 4.4 "Uncertainty Quantification". Additionally, a full demonstration of the uncertainty of the RothC model can be found in the ER Sheet "end-to-end calculations", specifically within the tab title "Full Bayesian MC Propagation".

2. Blank
   a. The final paragraph of Section 4.4.1 was updated to include the number of samples used in the bulk density model. A paragraph was added to section 4.4.1.2 of the PD to demonstrate the bulk density PPD analysis and its propagation through RothC.
   b. The final paragraph of Section 4.4.1 of the PD has been updated to include more information about the PTF's derivation and performance as well as reference specifically to sections 4.1.8 and 5.1 of the ATBD where the PTF is described in greater detail.
   c. The PD has been updated to reference Fig 11 and Table 3 of the ATBD for specific reference to the error associated with model training.
   d. The PD now contains reference to ATBD Section 5.1 where specifically Figures 9 and 10 and Table 2 address the sampling and measurement approach.
   e. Closed
   f. Closed
3. FAR01 edits can be found in Section 4.2.5 of the ATBD.

42) FAR02 edits can be found in Sections 4.1 and 4.2 of the PD.

43) FAR03 edits can be found Section 4.1.4 "Mining Satellite Data" of the ATBD.

44) FAR04 edits can be found in Section 4.4.1 of the PD.

45) FAR05 edits can be found in Section 4.4.1.1 and Section 4.4.1.2 of the PD, describing the sources of input uncertainty and conducting analysis of this uncertainty on the modeled outputs.

Documentation provided by project participant

Updated ATBD document

Updated PDD

full end-to-end calculations for one farm Kenya GL Excel sheet

DOE assessment	**Date :** 28/10/2024

1. Blank
   a. Closed
   b. Assessment is subject to closure of CAR#21 VVB assessment date 28/10/2024.
   c. Assessment is subject to closure of CAR#21 VVB assessment date 28/10/2024.
2. Blank
   a. No updates as requested and addressed by the PP are evident in the PD section 4.1.1 & following the VVB assessment date of 22/10/2024.
   b. No updates as requested and addressed by the PP are evident in the PD section 4.4.1 following the VVB assessment date of 22/10/2024.
   c. PP is requested to provide the vector file or documents for the same to validate as per the table.
   d. Under review.

e. Closed
f. Closed

46)

3. No updates as requested and addressed by the PP are evident in the ATBD in the referenced section following the VVB assessment date of 22/10/2024. PP is requested to share the revised file with all the edits.

Project participant response	**Date :** 28/10/2024

2.

a & b. The addition to the document may have been difficult to find due to multiple additions in the same section. For convenience the addition is replicated here in full:
Section 4.4.1: ... "*following the methodology outlined in section 4.1.8 of the ATBD with results detailed in Section 5.1 of the ATBD. Pedotransfer functions between organic carbon and bulk density are an established tool in soil science to convert between closely related soil parameters. Sand and silt concentrations, elevation (SRTM) and organic carbon were used as covariates to predict bulk density with an Extra Tree Regressor model using 555 samples of WOSIS data with performance of RMSE=0.21 on a held out test dataset."*

c. The ATBD has been updated and the current references are to Figures 14 and Table 5. Two files containing the actual and predicted values for the test and train datasets respectively have been provided in the "ATBD_suplemental_material" folder, corresponding to Figure 14 and table 5.

3. Some of the section references in the previous reply were incorrect. These have been corrected as follows:

FAR01 edits can be found in Section 5.3.9 of the PD.

47) FAR02 edits can be found in Sections 4.1 and 4.2 of the PD.

48) FAR03 edits can be found Section 4.1.4 "Mining Satellite Data" of the ATBD.

49) FAR04 is addressed in Section 4.1.4 of the ATBD.

FAR05 edits can be found in Section 4.4.1.1 and Section 4.4.1.2 of the PD, describing the sources of input uncertainty and conducting analysis of this uncertainty on the modeled outputs

Documentation provided by project participant

ke_grassland_test_obs_pred.csv

ke_grassland_train_obs_pred.csv

DOE assessment	**Date :** DD/MM/YYYY

Based on the detailed review of the supplementary data, revised documentation, and responses provided by the Project Participant (PP), the following conclusions address the original findings:

1. Adequacy of Revised PD and ATBD: The PP has addressed these concerns through the following updates:

- **Section 4.4.1:** PP incorporated pedotransfer functions to predict bulk density using covariates (sand and silt concentrations, elevation, and organic carbon) and implemented an Extra Tree Regressor model with 555 WOSIS samples. The RMSE value of 0.21 demonstrates reasonable performance. This update aligns with Section 4.1.8 of the ATBD.

- **ATBD Updates:** PP submitted supplemental files, including datasets and references (Figures 14 and Table 5), clarifying the results of the training and testing processes. The revised ATBD addresses the sources of input uncertainty, conducts analyses on uncertainty propagation, and documents improvements in error assessments for the machine learning model.
- While the PP provided detailed processes and supplementary files, geolocation data for training and testing datasets remains unavailable. The PP clarified that geolocation data was not retained due to separation during training but committed to incorporating this in future iterations i.e. at the time of verification for improved transparency.

2. Demonstration of Uncertainty in the Remote Sensing Model

- **Bulk Density Estimation:** Updates in the PD and ATBD clarified the use of pedotransfer functions and regression models for bulk density estimation. The incorporation of stratified sampling ensures coverage across soil texture strata, improving the QA/QC of remote sensing measurements.
- **Soil Carbon Measurements:** Ground sampling during verification (planned for January–February) will ensure accuracy and validate remote sensing results. Stratified random sampling, guided by soil texture strata, ensures statistically significant correlations for model calibration and error assessments.
- **Temporal Alignment:** The PP mitigated temporal misalignment of satellite data by restricting discrepancies to ≤14 days during model calibration. This conservative approach minimizes noise and ensures robust data quality.

The PP's response sufficiently demonstrates the robustness of the remote sensing model, its calibration, and the processes for addressing uncertainty.

3. Demonstration of Uncertainty in the RothC Model

- **Baseline and Improved Scenarios:** The RothC model calibration aligns SOC estimates with remote sensing measurements, ensuring consistency and addressing bias in the improved scenario. For baseline scenarios, the PP refrains from bias correction due to the conservative overestimation of SOC gains, as supported by literature validation (bias of 0.41 t/ha/year).
- **Input Data Uncertainty:** The revised PD includes a comprehensive Posterior Predictive Distribution (PPD) analysis, evaluating both modeling errors and input uncertainties. The detailed description is provided in PD, MVR and the ATBD document.

The RothC model's uncertainty and bias correction methodology are now adequately addressed, ensuring conservative and accurate ERR calculations.

4. FAR#02 and Supporting Evidence

The PP clarified the specific sections addressing FAR#02: Sections 4.1 and 4.2 of the PD are now updated, detailing the uncertainty analyses for input sources and modeled outputs. Section 4.1.4 of the ATBD, describing the process of mining satellite data. The revised ATBD and supplemental materials include updates to address uncertainty in SOC and BD estimates, as well as the interconversion of Sentinel-1 and ALOS-2 data for bias correction. The PP's detailed revisions and supporting evidence adequately address FAR#02.

CAR#22 is now closed based on the PP's comprehensive revisions to the PD and ATBD, supplemental evidence, and commitment to future improvements in transparency and traceability. Any residual

concerns, such as the retention of geolocation data and verification of sampling processes, will be addressed during the upcoming verification cycle. During the current scope of validation, the trend of the values i.e. data sources however, the exact match of the values shall be more precisely check at the verification stage.

CAR ID	24	**Section no.**		**Date :** DD/MM/YYYY
Description of CAR				
Issue 1. In Section 5.1 of the PD, the measurement methods and procedures for parameter A_0 are unclear. 2. In Section 5.2 of the PD: a. For unit area $Area_{an}$ and Ai, it is unclear what measurement methods and procedures will be applied to measure the project area. b. For modeled soil organic carbon stock pool fSOCbsl,,t, i. It is unclear what the selected methods for QA/QC are. ii. It is unclear what the known uncertainty of the remote sensing method is. c. Missing data/parameter Pwp,p for market leakage analysis. *50)* Action Required 1. PP must ensure that Section 5.1 of the PD includes the information highlighted in Issue 1. 2. PP must ensure that Section 5.2 of the PD includes the information highlighted in Issue 2. Program Rule(s) VM0042, v1.0, Sections 9.1 and 9.2 *VCS Project Description Template, v4.1*, Sections 5.1 and 5.2				
Project participant response				**Date :** 21/08/2024
1. Table for parameter A_0 was updated in section 5.1. 2. In section 5.2 of the PD, a. The unit area is updated with the required measurement units in section 5.2. b. The following changes were made to section 5.2 I. Section 5.3.9 of the PD has been updated with sufficient information on QA/QC procedures adopted to estimate the soil organic carbon stocks (QA/QC procedure for remote sensing, ground data collection, model corrections, etc.) II. Section 4.4 of the PD was updated with sufficient information on how uncertainty in the models and remote sensing etc. will be measured.				

c. The missing data/parameter Pwp,p for market leakage analysis was added

Documentation provided by project participant

Updated PD

DOE assessment	**Date:** DD/MM/YYYY

1. In Section 5.1 of the PD, the measurement methods and procedures for parameter A0 is now updated.
2. In section 5.2 of the PD,
    a. For unit area $Area_{an}$ and Ai, the measurement methods and procedures that shall be applied to measure the project area is updated in revised PD.
    b. For modeled soil organic carbon stock pool fSOCbsl,,t,
        i. The PD revision does not clarify the QA/QC procedures as required. The Quality Assurance/Quality Control (QA/QC) details remain ambiguous, and the Project Proponent (PP) has incorrectly referenced sections in the revised document. This oversight impedes the understanding of how QA/QC measures are implemented and verified. The PD must be updated to accurately describe the QA/QC processes and ensure that the correct sections are referenced to provide clear and comprehensive information.
        ii. No known uncertainty of the remote sensing method is found for the data parameter.
    c. Missing data/parameter Pwp,p for market leakage analysis has been added to revised PD.

Therefore CAR#24 is partially open.

Project participant response	**Date :** DD/MM/YYYY

1. Closed by VVB
2. Response
    a. Closed by VVB
    b. Response
        i. The incorrect references in Section 5.2 have been corrected. Refer to Section 5.3.9 which contains descriptions of the QA/QC procedures.
        ii. Section 5.2 now contains uncertainty of the remote sensing method as derived in Section 4.4.1.2 by using a Bayesian approach involving Monte Carlo simulations of the output of the remote sensing machine learning models.
    c. Closed. By VVB

Documentation provided by project participant

DOE assessment	**Date :** DD/MM/YYYY

1. Previously closed.
2. In section 5.2 of the PD, PP has revised the known certainty section with the SOC stock (tons CO2e/hectare) PPDs at start and end have standard deviations of 3.32 and 4.36 tons CO2e/hectare, respectively, with a covariance of 7.15 (tons CO2e/hectare)2 between the initial and final distributions (see Model Prediction Error, in Section 4.1 above. PP is requested to substantiate the revisions.

Project participant response	**Date :** 25/10/2024
2. These values are the standard deviation and covariance as computed through our PPD procedure originally. They appear updated in the document because the paragraph is copied from our boilerplate submission template and then the values are updated based on project specific results.	
Documentation provided by project participant	
DOE assessment	22/11/2024
The Project Proponent (PP) has clarified that the standard deviation and covariance values for the SOC stock (tons CO2e/hectare) at the start and end of the project period, as reported in Section 5.2 of the PD, were computed using their procedure. These updated values in the document reflect project-specific results, derived from their standardized methodology. Additionally, the PP has provided further context regarding the baseline scenario. The baseline root mean square error (RMSE) was computed using the true and predicted carbon tonnage values from the baseline validation dataset, with the specific values used for this calculation available in the accompanying Excel spreadsheet. The reported RMSE for the baseline scenario is **0.98 tons/(ha/year)**, while the RMSE for the project's improved practice scenario is effectively zero, constrained only by the numerical precision of the optimizer. Errors associated with the improved practice scenario are provided in the supplemental spreadsheet. The explanation substantiates the revisions made to Section 5.2, addressing the issue raised. No further action is required regarding this finding, and it is considered **closed**.	

CAR ID	26	**Section no.**		**Date :** DD/MM/YYYY
Description of CAR				
Issue The project ERRs have been estimated for the larger grouped project and does not reflect the project benefits of the project area of the initial PAIs included at validation. The project area at validation is 9,032 ha (22,321 acres), however, ERRs have been estimated for 211,375 ha (522,321 acres). Action Required PP must ensure the project revises the ERR sheets to include estimations only for the initial PAI (i.e., current project area). Further, the PP must ensure that the updated ERRs and project scale are correctly included in all relevant sections and tables of the PD. *52)* Program Rule(s) *VCS Standard, v4.5*, Section 3.15.1				

Project participant response	**Date :** 21/08/2024
The ERR sheet has been updated with the calculation pertaining to 1st instance of the project. The project scale is correctly included tallying with the ERR sheet. All the relevant tables have been updated in the PD.	
Documentation provided by project participant	
1. ER Sheet 2. Updated PD	
DOE assessment	**Date:** DD/MM/YYYY
PP mentioned that CH4 and N20 Emissions are zero in recent revisions. PP is requested to clarify. The further assessment is contingent upon this.	
Project participant response	**Date:** DD/MM/YYYY
In the Project Boundary section 3.3, we have clearly given an account of all noted sources of emissions. A separate excel workbook is also provided to the VVB to provide a sufficient demonstration, along with calculations, for why several GHG sources are excluded from the project boundary under both the baseline and project scenarios compared to SOC – where it is demonstrated that CH4 and N2O emissions are de minimis and negligible.	
Documentation provided by project participant	
DOE assessment	**Date:** 28/10/2024
The Project Boundary section (3.3) and the supplementary Excel workbook provided offer a clear and sufficient demonstration for the exclusion of several GHG sources from the project boundary under both baseline and project scenarios. It is adequately shown that CH_4 and N_2O emissions are de minimis and negligible, as the project does not involve typical agricultural practices that would contribute to these emissions. CAR#27 is closed.	

CAR ID	28	**Section no.**		**Date :** DD/MM/YYYY
Description of CAR				
Issue 1. Section 5.3 of the PD does not present sufficient information for the modelling plan. 2. The VR does not assess the appropriateness of the sampling design. Action Required 1. PP must ensure that Section 5.3 of the PD includes all the required information for the modelling plan per Section 9.3.2 of the methodology. Including: (i) How the model validation datasets will be identified and archived to permit periodic application to calculate model prediction error. (2) How the modelling plan specifies the baseline schedule of agricultural management activities for each sample unit. And (iii), details of all the parameter for model input variables.				

53)

Program Rule(s)

VM0042, v1.0, Section 9.3.1 and 9.3.2

VCS Standard, v4.5, Section 4.1.30

Project participant response	**Date :** 21/08/2024

1. Section 5.3 has been updated with additional information on the modelling plan.
2. Section 5.3 has been updated with additional information on the appropriateness of the sampling design used for technology validation as part of QA/QC.

Documentation provided by project participant

Updated PD

DOE assessment	**Date:** 27/08/2024

1. Revision of Monitoring Plan: It is essential that Section 5.3 of the Project Description (PD) comprehensively addresses the requirements outlined in Section 9.3.2 of the methodology and PD template v4.3. Specifically, the following aspects must be included:
    - Methodologies and Procedures: Please ensure that the PD elaborates on the methods for measuring, recording, storing, aggregating, collating, and reporting on monitored data and parameters. Where applicable, include detailed procedures for calibrating monitoring equipment. Given the baseline data collection is based on the RothC model, it is equally important to incorporate monitoring methods based on remote sensing models, as these form the backbone of actual ERR monitoring. Additionally, the PD should provide clear provisions for scenarios where satellite data may be unavailable during critical monitoring periods.
    - Organizational Structure and Competencies: The PD should also clearly define the organizational structure, detailing the responsibilities and competencies of the personnel involved in monitoring activities.
    - Internal Auditing and QA/QC Procedures: Please include procedures for internal auditing and quality assurance/quality control (QA/QC) within the monitoring plan. This will help maintain the integrity and reliability of the data collected.
    - Handling Non-Conformances: The procedures for addressing any non-conformances with the validated monitoring plan should be explicitly stated. This will ensure that any deviations (temporary or permanent) are managed effectively and in accordance with the project's objectives.
2. Inclusion of Modelling Plan Details: The PD must also include the following critical elements related to the modelling plan:
    - Model Validation Datasets: Describe how model validation datasets will be identified, stored, and archived to allow for periodic evaluation of model prediction accuracy.
    - Baseline Schedule of Agricultural Management Activities: Clearly specify how the modelling plan outlines the baseline schedule for agricultural management activities for each sample unit.
    - Parameters for Model Input Variables: Provide detailed information on all parameters required for model input variables, ensuring they are clearly defined and documented.

Therefore CAR#28 is open.

Project participant response	**Date:** DD/MM/YYYY

1. Revision of Monitoring Plan: Section 5.3 of the PD has been updated as outlined below.
   - Methodologies and Procedures: Section 4.1 and 4.2 have been updated to address the monitoring methods of both RothC and remote sensing models. In addition, Section 4.1 has been updated to address the possibility of the loss of a source of satellite data.
   - Organizational Structure and Competencies: The PD now includes a reference to the specific Organizational Structure and a breakdown of responsibilities in section 5.3.1. The roles responsibilities and and competencies of the Modeling Team are now additionally detailed in section 5.3.11.
   - Internal Auditing and QA/QC Procedures: Section 5.3.9 now includes our procedures for internal auditing and QA/QC.
   - Handling Non-Conformances: Section 5.3.13 now addresses that we do not foresee non-conformances since the entirety of the project area is measured via out modeling plan.

2. Inclusion of Modelling Plan Details: The following critical elements have been added to the modelling plan:
   - Model Validation Datasets: Section 5.3.10 has been updated to include details of how we will identify, store, and archive all of our data, including our Model Validation datasets.
   - Baseline Schedule of Agricultural Management Activities: Section 5.3.14 has been updated specifically to describe how the baseline schedule of activities will be attained.
   - Parameters for Model Input Variables: As noted in section 5.3.14, Section 5.2 has now been updated with 2 tables, detailing the Model Input Variables for both the Satellite Soil Carbon model and the RothC model.

Therefore CAR#28 is open.

Documentation provided by project participant

Revised PDD

DOE assessment	**Date:** 21/10/2024

1. The Project Proponent (PP) has satisfactorily addressed the required revisions in the Monitoring Plan, as outlined in Section 5.3 of the Project Description (PD).
   - Methodologies and Procedures: The updated Sections 4.1 and 4.2 now provide a comprehensive outline of the monitoring methods for both the RothC model and remote sensing models, ensuring alignment with the monitoring requirements. Additionally, the PD includes provisions for scenarios where satellite data may become unavailable during critical monitoring periods, which meets the expectations for contingency planning.
   - Organizational Structure and Competencies: The PP has included detailed information regarding the organizational structure and responsibilities in Sections 5.3.1 and 5.3.11, which clearly defines the roles and competencies of the Monitoring and Modeling Team. This update satisfies the requirement for transparency in personnel involvement in monitoring activities.
   - Internal Auditing and QA/QC Procedures: The inclusion of internal auditing and QA/QC procedures in Section 5.3.9 ensures a robust mechanism for maintaining data integrity and reliability. These procedures are in line with the expectations for quality control.
   - Handling Non-Conformances: The PP has added a statement in Section 5.3.13, asserting that non-conformances are not anticipated due to the comprehensive modeling approach used for the entire project area. While this addresses the concern, continuous vigilance in monitoring and reporting is advised to ensure any future deviations are managed effectively.

   Based on these updates, the finding is considered closed.
2. Upon review of the Project Proponent's (PP) response, the following issues remain open and require further clarification:
   - Model Validation Datasets: While Section 5.3.10 has been updated to describe the storage and archival processes for model validation datasets, the identification of these datasets

has not been clearly outlined. It is essential that the PD specifies how the datasets used for model validation will be identified to ensure proper evaluation of model prediction accuracy.

- Baseline Schedule of Agricultural Management Activities: The PP has mentioned that agricultural practices on participating ranches are recorded in consultation with the ranchers to establish the baseline schedule for activities used in the RothC model. However, this process remains vague and lacks sufficient detail on how these consultations are conducted and how the baseline schedule is determined and formalized. A clear and well-defined process must be outlined in the PD to ensure consistency and transparency.
- Parameters for Model Input Variables: The PP has referenced updates to Section 5.2, including two tables detailing model input variables for the Satellite Soil Carbon model and the RothC model. However, these tables were not found in the provided documentation. To close this finding, the PP must ensure that the referenced tables are included and provide a clear and detailed description of all required parameters for model input variables.

Given the above, further revisions are required to close this finding.

Project participant response	**Date:** DD/MM/YYYY

1. Closed

2.

- Model Validation Datasets: Section 5.3.10 of the PD has been updated to include a description of how all stored datasets will be identified, including the Model Validation Datasets.
- Baseline Schedule of Agricultural Management Activities: The consultations with ranchers to establish the baseline schedule of grassland management activities are conducted in accordance with the VM0042 Methodology, specifically following Box 1, Option 3. This approach involves determining the baseline schedule through direct consultation with the ranchers and substantiating the information with a signed attestation from the landowner of the sample field for the relevant period. During these consultations, both quantitative and qualitative data were collected to provide a comprehensive understanding of past grazing practices. The process included in-depth discussions with the ranchers to gather detailed information, which was subsequently verified and formalized through the landowner's attestation. This is further elaborated in Section 3.4 of the PD.
- Incorrect reference in previous response. The Tables 16 and 17 detailing model input variables can be found in Section 4.1 and 4.2 of the PD. The inputs to the Satellite Soil Carbon model are given in the first paragraph of pg. 114 of the PD, and Table 4 in Section 5.1 of the ATBD.

Documentation provided by project participant

Updated ATBD document

Updated PDD

DOE assessment	**Date:** 28/10/2024

1. Noted. The revisions have been made in the PD as requested.
2. The PP is requested to provide further clarification on how overgrazing is present across all three schedules of activities, particularly considering the differing land use practices under each form of land ownership: community-managed and owned lands, privately owned lands with communal management, and individually owned private grasslands. Given the influence

of land ownership structure on grazing patterns and land management intensity, it is essential to understand the variations in grazing pressure, stocking rates, and rotation practices across these land types. Additionally, a clear outline of baseline agricultural management activities has not been provided, leaving gaps in the comparative assessment of current versus baseline practices. Detailed and precise information on these aspects is requested to support a comprehensive evaluation of the baseline and project scenarios. If not previously submitted, PP is requested to substantiate this clarification with supporting data.	
Project participant response	**Date:** DD/MM/YYYY
2. Please refer to CAR#19, which was previously closed. In response, Section 3.4 of the PD was updated to provide more detailed information on the baseline scenario across the three land tenure/land use scenarios. We included an account of overgrazing and unsustainable grazing practices present in the baseline for each ownership scenario. The baseline scenario for each land tenure category now describes prevailing livestock grazing activities, highlighting issues such as unsustainable grazing, overgrazing impacts, ecological imbalance, etc. The baseline survey details were also updated in section 3.4, to give a comprehensive assessment of baseline management activities, providing both qualitative and quantitative information. Additionally, Section 1.12 includes a table comparing baseline and current project activities, as well as further details on the "Grazing Model." This was previously addressed in CAR#15, which has also been closed.	
Documentation provided by project participant	
DOE assessment	**Date:** 31/10/2024
While CAR#15 was previously closed, it appears that some areas relevant to the current request in PRR R1 may not have been fully addressed. Specifically, the details previously provided under CAR#15 may not sufficiently capture the improved grazing practices and now considered within the Monitoring and Verification Report (MVR) as per Table 3. Therefore, we note that this CAR may require reopening to ensure alignment with the updated project practices and the qualitative and quantitative baselines now outlined in Section 3.4. Further clarification may be needed on the applicability of these practices across different land tenure categories. No further response is required from PP for now and contingent upon CAR#21	

CAR ID	29	**Section no.**		**Date :** 11/03/2025

Verra Response

Section 1.5 of the PD has been updated. However, issues remain, and the findings cannot be closed.

Issue

1. The project describes 3 different baseline scenarios (Section 1.8, 1.12 and 3.4 of the PD); however, the initial PAI only includes 1 baseline scenario (i.e., Scenario 3: private land ownership). Therefore,
    a. The statement in Section 1.5 that all future instances will have the same baseline is incorrect.
    b. The project is not validated to include future instances with baseline Scenarios 1 and 2 described in the PD.

Action Required

1. PP must ensure the PD is updated to:
    a. Exclude baseline scenarios not represented by the initial PAI from Section 3.4 and other relevant sections (e.g., 1.8, 1.12): Scenarios 1 or 2.

    54) OR,

    b. Demonstrate that there are initial PAIs with Baseline Scenarios 1 and 2. Then, revise Section 1.5 as needed.

Program Rule(s)

VCS Standard, v4.5, Sections 3.6.11, 3.6.15, 3.6.16 (4)

Project participant response	**Date :** 21/03/2025
The current PDD describes Scenario 3, as outlined in Section 1.12. However, as stated in the PD, we plan to reassess the baseline and integrate community lands under Scenario 1 and Scenario 2 during our next audit cycle. Once onboarded, these lands will undergo baseline and additionality assessments, supported by comprehensive documentation, including an implementation plan, and the designated area of implementation.	
Documentation provided by project participant	
Revised PDD, Community land map	
DOE assessment	**Date:** DD/MM/YYYY

The audit team reviewed the revised Project Document (PD) and observed that the Project Participant (PP) has neither excluded Baseline Scenarios 1 and 2 from the relevant sections nor demonstrated that there are initial Project Activity Instances (PAIs) associated with these baseline scenarios. As a result, the identified finding cannot be closed. PP is requested to update the PD to include the appropriate information. Additionally, in Section 1.5 of the PD, it is stated: "This project is a grouped AFOLU project having multiple instances across two distinct Geographic Areas (GAs) in South America: Argentina and Paraguay." This statement is incorrect and appears to have been copied from another project. PP must update this section with accurate and project-specific information. As these issues remain unresolved, the finding remains open.

Project participant response	**Date :** 01/04/2025
Section 3.4 of the baseline scenario has been revised to present a single, comprehensive scenario. This revision provides a detailed explanation of the inevitable degradation of grasslands due to continuous overgrazing, driven by the absence of structured grazing management, land-use conflicts, and increasing pressure on limited pasture resources. Across various land tenure systems - including community lands and private grasslands, unsustainable grazing practices have resulted in severe ecological consequences, such as vegetation depletion, soil erosion, and biodiversity loss. Additionally, all relevant sections, including 1.12, 1.8, 1.5, and other applicable parts throughout the PD, have been updated accordingly.	
Documentation provided by project participant	
Revised PDD	
DOE assessment	**Date:** 08/04/2025
The audit team has reviewed the revised PDD and confirmed that Section 3.4 now presents a comprehensive account of grassland degradation due to continuous overgrazing. The revision addresses contributing factors such as unstructured grazing management, land-use conflicts, and increasing pressure on limited pasture resources, along with the resulting ecological impacts—vegetation loss, soil erosion, and biodiversity decline—across different land tenure systems. Updates to related sections (1.12, 1.8, 1.5, and others) have also been made. As a result, the finding is now considered closed.	

CAR ID	30	**Section no.**		**Date :** 11/03/2025

Verra Response

Section 2 of the PD has been updated. However, the issues raised have not been sufficiently addressed, and the finding cannot be closed.

Issue

1. Inconsistent information about the number of ranchers participating. Section 2.1 of the PD mentions 24 participating ranchers, but the initial PAI only includes 3 ranches.
2. It is not demonstrated that all stakeholder groups were represented in the stakeholder meetings. The submitted supporting evidence provides names of invitees, and email ids, however,
    a. It is not clear which stakeholder groups are represented.
    b. It is not clear which stakeholders were invited by other means (e.g., telephone/in person), and which stakeholder groups they represent.

Action Required

1. PP must ensure the project updates Section 2.1 of the PD to remove inconsistent information.
2. PP must ensure the project sufficiently demonstrates that all stakeholder groups are represented in the stakeholder consultation.

Program Rule(s)

VCS Standard, v4.5, Section 3.18

Project participant response	**Date :** DD/MM/YYYY

1. Section 2.1 has been updated to remove inconsistencies. It now clearly states that there are three participating ranches in PAI 01 of the project and that 100% of the project ranchers attended the meetings.
2. Additionally, Section 2 has been revised to demonstrate that all stakeholder groups identified in Section 2.1.1 were invited and adequately represented in the meetings and consultations conducted to date, in compliance with Section 3.18 of the VCS Standard v4.5. The methods of invitation have also been clarified. Comprehensive details on stakeholder meetings are provided in Appendix 2 of the PD.

Documentation provided by project participant

Revised PDD

DOE assessment	**Date:** DD/MM/YYYY

1. The audit team has reviewed the revised PD and confirmed that Section 2.1 has been updated with consistent and accurate information, explicitly stating that three participating ranchers are involved in the first PAI.
2. It has also been confirmed that PP has revised Section 2 of the PD to clearly demonstrate that all stakeholder groups identified in Section 2.1.1 were invited and appropriately represented in the meetings and consultations conducted to date, ensuring compliance with Section 3.18 of the VCS Standard v4.5. Additionally, the methods of invitation have been clarified, and comprehensive details of stakeholder meetings are now provided in Appendix 2 of the PD.

Therefore, the findings are closed.

CAR ID	31	Section no.		Date : 11/03/2025
Description of CAR				

Verra Response

The project has updated Section 3.3 of the PD and submitted an ERR sheet to support the demonstration. However, issues still remain, and the finding cannot be closed.

Issue

1. Section 3.3 of the PD does not clearly describe all the GHG emission sources required by the methodology or provide a clear justification for their inclusion/exclusion.
    a. It is unclear how the excluded emission sources (e.g., emissions from livestock and biomass burning) will be monitored in the project scenario to ensure that these emission sources remain *de minimis*.

Action Required

1. PP must ensure the project updates tables in Section 3.3 of the PD to include all GHG emission sources per the methodology and clearly justify their inclusion/exclusion from the project boundary.
2. PP must further justify the exclusion of these emission sources, including an justification of how these emission sources will remain *de minimis* over the project crediting period, otherwise,
    a. The emission sources must be included in the project boundary (they can remain *de minimis* in the ex-ante estimates).
    b. PP must ensure the project has a clear monitoring plan to monitor all parameters related to livestock emissions and emissions from burning of biomass in the project scenario, and that the project updates Sections 4 and 5 accordingly.

Program Rule(s)

VM0042, v1.0, Section 5 (Table 3)

Background

- Livestock are included in the project boundary, and numbers are subject to change. This has to be monitored and emissions from livestock must be shown as *de minimis* at every monitoring and verification event.
- Controlled burning is listed as a project activity.

Project participant response	**Date :** DD/MM/YYYY

1. The Tables 10 and 11 in section 3.3 includes all GHG emission sources per the methodology and clearly justify their inclusion/exclusion from the project boundary. 2. Section 3.3 of the PD provides a detailed demonstration of the excluded emission sources, justifying their exclusion based on de minimis thresholds in accordance with VM0042 methodology. Section 5.3.9 (along with 5.3.7 and 5.3.8) outlines a comprehensive monitoring plan to systematically track and ensure that livestock-related emissions, manure deposition, nitrogen fertilizer application, fossil fuel use, and biomass burning remain below the de minimis threshold throughout the project crediting period. The monitoring plan includes regular ranch surveys, remote sensing, field inspections, and cross-verification of ranch records, ensuring that any changes in these sources are identified, assessed, and addressed if necessary. Section 5.2 is also updated with necessary monitoring parameters. Also please note that: • Controlled burning is not listed as a project activity and is not included anywhere in the PDD
Documentation provided by project participant
Revised PDD; Project Boundary excel spreadsheet
DOE assessment | **Date:** DD/MM/YYYY

1. The audit team has reviewed the revised PD and noted that Table 11 in Section 3.3 does not clearly present all greenhouse gas (GHG) emission sources as required by the methodology. To ensure alignment with the methodology, please revise Table 11 to accurately reflect all relevant GHG emission sources and clearly justify their inclusion or exclusion. The revision should be based on the guidance provided in Table 3 of the Methodology (VM0042) under Section 5 – Project Boundary.

55)

Table 3: GHG Sources Included In or Excluded From the Project Boundary in the Baseline and With Project Scenario

Source	Gas	Included?	Justification/Explanation
Soil organic carbon	CO_2	Yes	Quantified as stock change in the pool, rather than an emissions source (see Table 2).
Fossil fuel	CO_2	S*	The sources of fossil fuel emissions are vehicles (mobile sources, such as trucks, tractors, etc.) and mechanical equipment required by the ALM activity.
Soil methanogenesis	CH_4	S*	
Enteric fermentation	CH_4	Yes	If livestock are present in the project or baseline scenario, CH_4 emissions from enteric fermentation must be included in the project boundary.
Manure deposition	CH_4	Yes	If livestock are present in the project or baseline scenario, CH_4 and N_2O emissions from manure deposition and management must be included in the project boundary.
	N_2O	Yes	
Use of nitrogen fertilizers	N_2O	Yes	If in the baseline scenario the project area would have been subject to nitrogen fertilization, or if nitrogen fertilization is greater in the with project scenario relative to the baseline scenario, N2O emissions from nitrogen fertilizers must be included in the project boundary.
Use of nitrogen fixing species	N_2O	Yes	If nitrogen fixing species are planted in the project, N_2O emissions from nitrogen fixing

56)

VM0042, Version 1.0

Sectoral Scope 14

Source	Gas	Included?	Justification/Explanation
			species must be included in the project boundary.
Biomass burning	CO_2	Excluded	However, carbon stock decreases due to burning are accounted as a carbon stock change
Biomass burning	CH_4	S*	
	N_2O	S*	
Woody biomass	CO_2	S*	Quantified as stock change in the pool, rather than an emissions source (see Table 2).

57) Therefore, the findings remain open.

2. The audit team confirms that Section 3.3 of the revised PD appropriately demonstrates the excluded emission sources, justifying their exclusion based on de minimis thresholds in accordance with VM0042 methodology.

Section 5.3.9, along with Sections 5.3.7 and 5.3.8, outlines a comprehensive monitoring plan designed to systematically track and verify that livestock-related emissions, manure deposition, nitrogen fertilizer application, fossil fuel consumption, and biomass burning remain below the de minimis threshold throughout the project crediting period. The monitoring approach incorporates regular ranch surveys, remote sensing, field inspections, and cross-verification of ranch records to ensure that any changes in these sources are promptly identified, assessed, and addressed if necessary. Additionally, Section 5.2 has been updated to include the necessary monitoring parameters for effective oversight and compliance. Therefore, the finding is closed

Project participant response	**Date :** 01/04/2025
Table 11 is now updated to align to the format of Table 3 of **VM0042** document. All the sources listed in **Table 11** of the project boundary section are the same as those listed in **Table 3** of the **VM0042** document. **Table 11 in Section 3.3** clearly presents all greenhouse gas (GHG) emission sources as required by the methodology. It includes all relevant sources, such as **soil organic carbon, soil methanogenesis, fossil fuel use, enteric fermentation, manure deposition, nitrogen fertilizer application, nitrogen-fixing species, biomass burning, and woody biomass changes** – both in the baseline and project scenarios.	
DOE assessment	**Date:** 08/04/2025
The audit team reviewed section 3.3 of the PD and confirmed that Table 11 has been updated. The finding is closed now.	

CAR ID	32	**Section no.**		**Date :** 11/03/2025
Description of CL				

Verra Response

The NPRR and VR have been updated. However, the issues raised have not been sufficiently addressed, and the finding cannot be closed.

Issue

1. *Project Management* (f): The project's monitoring plan is not an adaptive management plan.
    a. The monitoring plan in the project description does not contain an adaptive management plan.
2. *Financial Viability*: Insufficient justification of risk scores.
    a. the risk score for point (h) justified by stating that no significant equipment or land purchases are required. However, financial viability should assess the project activities, not just the PP requirements.
    b. Despite claiming investment barriers, the project has secured over 80% of the necessary funds.
3. *Opportunity Cost:*
    a. It is still unclear how private land production are considered subsistence activities, considering that the initial PAI is a large land holding owned by individuals/companies. The VVB does not assess how the project's baseline is subsistence activities.
    b. It is unclear how the project has a legally binding agreement over the crediting period, considering that the agreement between ranchers and Boomitra is only for a period of 10 years, renewable, and is not legally binding for the entire crediting period.

Action Required

1. An actual adaptive management plan must be presented and assessed by the VVB. Otherwise, the project must correct the score for the category *Project Management* by removing the mitigation score applied for question (f).
2. PP must ensure that the NPRR is updated to:
    a. Provide more information on the project's financial viability, stating clearly the funding that the project has secured relative to what is needed.
    b. Clarify how baseline activities are subsistence driven, considering the initial PAI is all large land holding, owned by individuals/companies.
    c. Clarify the justification to apply mitigation score h in *Opportunity Cost*, considering the agreements with ranchers are not legally binding for the entire crediting period.
3. PP must ensure any changes to the risk score are consistently revised across all project documents and ERRs.

Program Rule(s)

VCS Non-Permanence Risk Tool v4.0.

Project participant response	**Date :** DD/MM/YYYY

1. In Project Management section, the Adaptive Management Plan has been clearly revised in section 5.3.16 and Appendix 4 of the PD describing the strategies and mitigation plans for the risk identified in NPRR. Hence the risk score remains unchanged.
2.
    a) More information on project's viability is provided, stating clearly the funding that the project has secured relative to what is needed.
    b) The baseline activities are not subsistence-driven, as explained in the Baseline Scenario section of the PD. Hence, according to Section 2.2.3, Table 3 of the AFOLU NPR Tool, we have selected "No" for question Q1: "Are the baseline activities subsistence-driven?" We then proceeded to answer Q2, selecting option "d" and providing a detailed explanation and NPV analysis supported by peer-reviewed publications. Please refer to the "opportunity cost" section of the NPRR report for more information. Additionally, the project addresses questions Q3 and Q4 of Section 2.2.3 in the AFOLU NPR Tool.
    c) The Opportunity Cost section in NPRR has been updated with justification. The ranchers have an agreement of total 30 years, (automatically renewable after 10-year initial term, till 30 years of total term) with Boomitra. Partners and ranchers have a separate agreement among themselves, for a total period of 40 years ensuring the implementation of activities throughout the crediting period.

    58)
3. Project Longevity has been revised to 40 years with the legally binding agreements in place with the partners. Hence the total risk rating for the Project longevity has changed. The overall NPR Risk Rating is now updated to 10%.

Documentation provided by project participant

Revised PDD; NPRR document and the NPR calculation spreadsheet, Revised ERR sheet, Partner Level Agreement and Sample Carbon Agreement

DOE assessment	**Date:** DD/MM/YYYY

1. PP has updated their adaptive management plan in PD appendix 4, where all natural risk mitigation strategies have been elaborated, the VVB has reviewed the adaptive management plan in PD & NPRR and found it justifiable hence the finding is closed,
2. A) PP has updated their financial viability section thoroughly where PP has demonstrated more elaborately on how they have achieved successful investment, VVb reviewed it and found it satisfactory, hence the finding is closed.

59) B) "***A subsistence-driven baseline scenario typically refers to a situation or model used in environmental, economic, or social planning that assumes people are primarily focused on meeting their basic needs—such as food, shelter, and water—using the resources directly available to them. This scenario is often used in studies or projections about the future to understand how communities or populations may behave or develop if they are primarily concerned with subsistence survival rather than pursuing economic growth, technological advancement, or other forms of progress."***

60)

61) PP is expected to clarify elaborately how the baseline scenario is not subsistence driven and also provide this clarification in PD as well The finding is open.

62) C) The opportunity cost has been updated by the PP and was reviewed by the VVB the finding is satisfactorily closed.

3. The Project longevity was revised and the legally binding agreement in corresponding to it has also been revised hence the finding is closed.

Project participant response	**Date :** 01/04/2025

As explained in the updated PD, the baseline scenario consists of continuous grazing on privately owned land, with no crop production. The PD does not state that these activities are solely for local consumption, as the landholdings are large and owned by individuals or companies engaging in structured grazing operations. Furthermore, the project introduces a secondary income stream through carbon finance, which will indirectly enhance livelihoods. These points have now been clearly explained and addressed in the revised PD.

The image below is from the AFOLU Non-Permanence Risk Tool v4.2. As shown, the project activities are not subsistence-driven, which is why we have answered "No" to Q1. We then proceeded to Q2, providing justification for option (d) along with an NPV analysis in the NPRR.

Table 3: Opportunity Cost

Opportunity Cost		Score
Q1	Are the baseline activities subsistence-driven? If *No*, proceed to Q2. If *Yes*, proceed to Q3.	
Q2	What is the NPV of the most profitable alternative land use activity compared to the NPV of the project activity? A response is only required if the answer to Q1 is *No*	
a)	Net present value (NPV) of the most profitable alternative land use activity is expected to be at least 100 percent more than that of the project activities.	8
b)	NPV of the most profitable alternative land use activity is expected to be greater than 50 percent and up to 100 percent more than that of project activities.	6
c)	NPV of the most profitable alternative land use activity is expected to be greater than 20 percent and up to and including 50 percent more than that of project activities.	4
d)	NPV of the most profitable alternative land use activity is expected to be 20 percent or less than that of project activities.	0
e)	NPV of project activities is expected to be greater than 20 percent and up to 50 percent more profitable than that of the most profitable alternative land use activity.	−2

Documentation provided by project participant

Updated PD

DOE assessment	**Date:** 08/04/2025

The audit team has reviewed the updated PD and confirmed that the PP has clarified the baseline scenario involves continuous grazing on privately owned land, with no crop production. It is noted that the PD does not claim these activities are solely for local consumption, as the land is owned by individuals or companies conducting structured grazing operations. Additionally, the project introduces carbon finance as a secondary income stream, which is expected to indirectly improve livelihoods. These clarifications have been clearly addressed now in the revised PD. The finding is closed.

CAR ID	33	Section no.		Date : 10/06/2025

Description of CAR

Relevant sections of the NPRR and Section 3.4 of the VR have been updated. Action 2a has been sufficiently addressed. However, Actions 1, 2b, 3, and 4 have not been sufficiently addressed, and the finding cannot be closed.

Issue

1. *Opportunity Cost*
    a. The justification and assessment of opportunity cost in the PRR response, NPRR and VR are inconsistent. See Background.
2. *Project Longevity*
    a. It is insufficiently justified that the project has a legally binding agreement for the entire project longevity period of 40 years. See Background.
3. Adaptive Management Plan
    a. The project has updated the PD to include an adaptive management plan. However, the plan only includes natural risks and their mitigations. It is unclear how the adaptive management plan meets the requirements of the NPRT, v4.0. See Background.

Action Required

1. PP must ensure that the project revises the NPRR to address the points raised in Issues 1-3. The VVB must ensure any changes to the risk score are consistently revised across all project documents and ERRs.

Program Rule(s)

AFOLU Non-Permanence Risk Tool v4.0.

Background

Issue 1

- PRR response: The response in the PRR refers to questions in v4.2 of the tool, and not the applied version (v4.0). This includes “we have selected "No" for question Q1: "Are the

baseline activities subsistence-driven?" We then proceeded to answer Q2, selecting option "d" and providing a detailed explanation and NPV analysis supported by peer-reviewed publications."

- The NPRR (v4.0) states 'Hence, nevertheless, to be conservative, it is assumed that NPV of the most profitable alternative land use activity is expected to be 20 percent or less than that of project activities. Hence, the risk rating is 0. '- therefore, the baseline activities per the project's NPRR are NOT subsistence driven.
- Section 3.4 of the VR "In line with Section 2.2.3 of the AFOLU Non-Permanence Risk Tool v4, when baseline activities are subsistence-driven, a full NPV analysis is not mandatory. Instead, the assessment must demonstrate net-positive social and economic outcomes, which this project clearly provides. Given the subsistence nature of the baseline, the marginal opportunity cost, and the net-positive impacts on local livelihoods, the risk rating for this category is assigned as 0."- i.e., the VVB assessment refers to the baseline being subsistence driven and is inconsistent with the project's justification and demonstration.

Issue 2

- The contract between PP and IP demonstrates intent to continue the practice to 40 years and therefore a project longevity period of 40 years is appropriate. Per the NPRT, v4.0 : 'Legal agreement or requirement to continue the management practice refers to any legally enforceable agreement or requirement, such as a conservation easement or protected area law requiring the continuation of the management practice that sequesters carbon or avoids emissions for the project's longevity."
- It is unclear how the agreement between the PP and IP is considered legally binding for the management practices to continue. Further, the agreement between the landowner (responsible party to continue management practices) and IP is defined up to a period of 10 years renewable up to 30 years.

Issue 3

The project's adaptive management plan in Appendix 4 of the PD includes natural risks and their mitigations. However, per the NPRT v4.0, Section 2.2.1 (5): "Projects shall have an adaptive management plan. Adaptive management plans identify, assess, and create a mitigation plan for

potential risks to the project, including those identified in this document, and any other obstacles to project implementation. They include a process for monitoring progress, documenting lessons learned or corrections that may be needed and incorporating them into project decision-making in future monitoring periods. The onus is on the project proponent to demonstrate that such plans are in place and have considered potential risks and obstacles to the project. Further, a system is in place for adapting to changing circumstances."

Project participant response	**Date :** DD/MM/YYYY

1. Opportunity cost

The baseline activities are NOT subsistence-driven, as explained in the Baseline Scenario section of the PD. Hence, according to Section 2.2.3, Table 3 of the AFOLU Non-Permanence Risk Tool v4.0, we have selected option “d” where we have justified that NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities.

In VCS-Risk-Report-Calculation-Tool-v4.0, in the Opportunity Cost section, for the question “what the NPV from the most profitable alternative land use activity compared to NPV of project activity”, we have selected option “d” and justified the same as above, providing a detailed explanation and NPV analysis supported by peer-reviewed publications. Please refer to the "opportunity cost" section of the NPRR report for more information.

The same must be corrected and updated in the section 3.4 “Assessment of Opportunity Cost Risk Factor” of the VR.

2. Project Longevity

Boomitra has a legal agreement (Partner Level Agreements) in place with Implementation Partners (IPs) for a period of 40 years with an intent to continue the management practices and maintain the longevity of the project, which is longer than the project crediting period. Hence, the project longevity is 40 years. However, the Ranch level agreements with the landowner are of 10 years automatically renewable for 30 years. As these ranchers are primary responsible parties to continue the management practices, there is no legal agreement binding commitment with these parties to continue management practices that protect the credited carbon stocks over the length of the project crediting period. Hence necessary updates are made accordingly to the NPRR and the VCS-Risk-Report-Calculation-Tool-v4.0-Kenya Grasslands excel sheet, particularly with regards to the Mitigation score (h) in the Opportunity cost section and the Project longevity sections. The Risk Rating has been updated and is now revised to 15%. Necessary updates are also made in the ERR sheets, and the PDD.

3. Adaptive Management Plan

According to the NPRT v4.0, Section 2.2.1 (5), a comprehensive Adaptive Management Plan has been developed as a standalone document and will be submitted for review during the Verification Audit, and the summary of the same is attached in the Appendix 4 of the PDD. This Adaptive Management Plan not only includes the natural risks and their mitigations, but also identifies, assess, and creates a mitigation plan for potential risks to the project, including those identified in the NPRR, and any other obstacles to project implementation. Hence the document demonstrates the plans that are in place for the potential risks and obstacles to the project.

Documentation provided by project participant

Updated PDD, ERR sheets, NPRR

DOE assessment	Date: DD/MM/YYYY
a) The Project Proponent has substantiated that the baseline activities are not subsistence-driven, aligning with Option “d” in the AFOLU Non-Permanence Risk Tool v4.0 (Table 3, Section 2.2.3), which indicates the net present value (NPV) from the most profitable alternative land use is expected to be between 20% more and up to 20% less than that of the project activities. This conclusion is supported by a comprehensive NPV analysis comparing rotational grazing with alternative uses such as maize and wheat farming—detailed in the NPRR and documented in the VCS Risk Report Calculation Tool v4.0. Peer-reviewed literature backs the claim that, although crop farming may yield higher short-term returns, its long-term profitability declines due to ecological and economic pressures, making rotational grazing a comparably viable alternative in terms of NPV. Based on the review finding for ISSUE is closed. b) The Project Proponent reports a 40-year agreement with Implementation Partners and rancher-level carbon agreements structured as 10-year initial contracts automatically renewable for up to 30 additional years. However, under NPRT v4.0 Section 2.2.4 (Table 4, criterion Q7), a legally enforceable agreement covering the entire project longevity period is required to qualify for a reduced risk rating Although the arrangement suggests continuity "in theory," the automatically renewable rancher contracts do not constitute an irrevocable legal obligation, as required, that ranchers must continue the specified management practices throughout the full 40-year period. Consequently, the project lacks the legally binding guarantees needed to secure the -2% longevity risk mitigation score and instead must apply a 0% score. As a result, the findings remain open, pending submission of enforceable legal instruments (e.g., conservation easements, legally binding long-term contracts, or regulatory mandates) that extend the rancher obligations across the full project longevity term. The finding remain open. c) The Project Proponent has provided a comprehensive adaptive management plan in standalone form, with a summary included in Appendix 4 of the PDD. This plan addresses not only natural risk factors but also encompasses a wide range of potential challenges identified in the NPRR and other project documentation. It clearly defines processes for identifying, assessing, and mitigating risks, includes provisions for ongoing monitoring, and establishes mechanisms for documenting lessons learned and making program adjustments as required under Section 2.2.1(5) of the AFOLU Non-Permanence Risk Tool v4.0 Based on this evidence, the adaptive management plan satisfies all relevant requirements of the NPRT, demonstrating that a systematic approach is in place to respond to evolving project conditions and to communicate those adaptations in future monitoring periods. Therefore, this finding is considered resolved and closed.	
Project participant response	**Date :** DD/MM/YYYY

b)

PP would like to clarify that the project applies the AFOLU Non-Permanence Risk Tool (NPRT) Version 4.0, not Version 4.2. The reference to Table 4, Criterion Q7, as cited in the comment, corresponds to Version 4.2, and not the version applicable to our project. All risk assessments and justifications have been made in accordance with Version 4.0, which is the applicable version at the time of validation.

Boomitra has entered into legally binding 40-year agreements with Implementation Partners. These agreements clearly outline the intention and commitment to maintain the required land-use practices for the full project longevity. This contractual arrangement covers a period that exceeds the project crediting period of 20 years and provides a solid foundation for demonstrating long-term project permanence and hence project longevity.

At the rancher level, Boomitra has signed carbon agreements with landowners that are valid for an initial term of 10 years, with automatic renewals for up to a total term of 30 years. These agreements include clear terms related to management practices and revenue sharing. The 10-year initial term aligns with the requirement to reassess the project baseline every decade. Upon reassessment, the agreements are renewed automatically, ensuring continuity of practices over the full project crediting period. While the agreements are structured in renewable blocks, they include the legal mechanisms necessary to extend obligations throughout the crediting period.

In line with Section 2.2.4(3) of NPRT v4.0, Boomitra has demonstrated its intent to continue the land management practices long-term through the combination of implementation partner agreements and rancher-level contracts, as well as supporting management plans. Furthermore, per Section 2.2.4(6), the tool requires a minimum project longevity of 30 years. The current agreement structure meets this requirement through legally renewable terms up to 30 years, and not less than that, hence meeting the minimum requirement. Although the rancher contracts are not yet structured as irrevocable 40-year commitments, we are actively working toward updating them accordingly.

Given this, the project has not claimed the -2% risk mitigation credit under Table 3, Criterion h (see below image), and has instead conservatively applied a score of “0.”

Table 3: Opportunity Cost

Opportunity Cost		
a)	NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated	8
b)	NPV from the most profitable alternative land use activity is expected to be between 50% and up to100% more than from project activities	6
c)	NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities	4
d)	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated	0
e)	NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity	-2
f)	NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity	-4
g)	**Mitigation:** Project proponent is a non-profit organization	-2
h)	**Mitigation:** Project is protected by legally binding commitment (see Section 0) to continue management practices that protect the credited carbon stocks over the length of the project crediting period	-2
i)	**Mitigation:** Project is protected by legally binding commitment (see Section 0) to continue management practices that protect the credited carbon stocks over at least 100 years	-8
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g + h or i)] Total may be less than 0		

Similarly, in 2.2.4, Table 4, we have selected Option (a) (see below image) reflecting the current status of rancher agreements in line with Version 4.0 requirements.

Table 4: Project Longevity

Project Longevity		
a)	Without legal agreement or requirement to continue the management practice	= 24 - (project longevity/5)
b)	With legal agreement or requirement to continue the management practice	= 30 - (project longevity/2)
Total Project Longevity (PL) Total may not be less than zero		

As a result of these considerations and revisions, the project's overall non-permanence risk rating has been updated to 15%, and the necessary changes have been reflected in both the ERR spreadsheets and the PDD.

VVB Assessment
Following a detailed review of the updated documentation and project participant responses, the VVB confirms that all issues under CAR ID 01 have been adequately addressed. The project has demonstrated that baseline activities are not subsistence-driven and has consistently applied Option "d" under Section 2.2.3 of the AFOLU Non-Permanence Risk Tool v4.0 across all relevant documents, supported by a robust NPV analysis. Regarding project longevity, while rancher-level agreements are not irrevocable 40-year commitments, the project has conservatively applied a 0% mitigation score and accurately reflected this in all risk assessment tools in alignment with NPRT v4.0 requirements. The adaptive management plan, submitted as a standalone document and summarized in Appendix 4 of the PDD, comprehensively addresses natural and implementation risks and meets the requirements of Section 2.2.1(5) of the NPRT. The final non-permanence risk rating of 15% is correctly calculated and transparently justified. Therefore, CAR ID 01 is considered fully resolved and is now closed.

History of the document						
Version	Date	Nature of Revision	Prepared by		Reviewed by	
			Name	Date	Name	Date
1	27/12/2023	Addition of guidance on type of finding to be raised	Shifali Guleria	27/12/2023	Deepika Mahala	27/12/2023
0	01/10/2022	Initial adoption	Shifali Guleria	01/10/2022	Deepika Mahala	01/10/2022

Additional FAR Responses

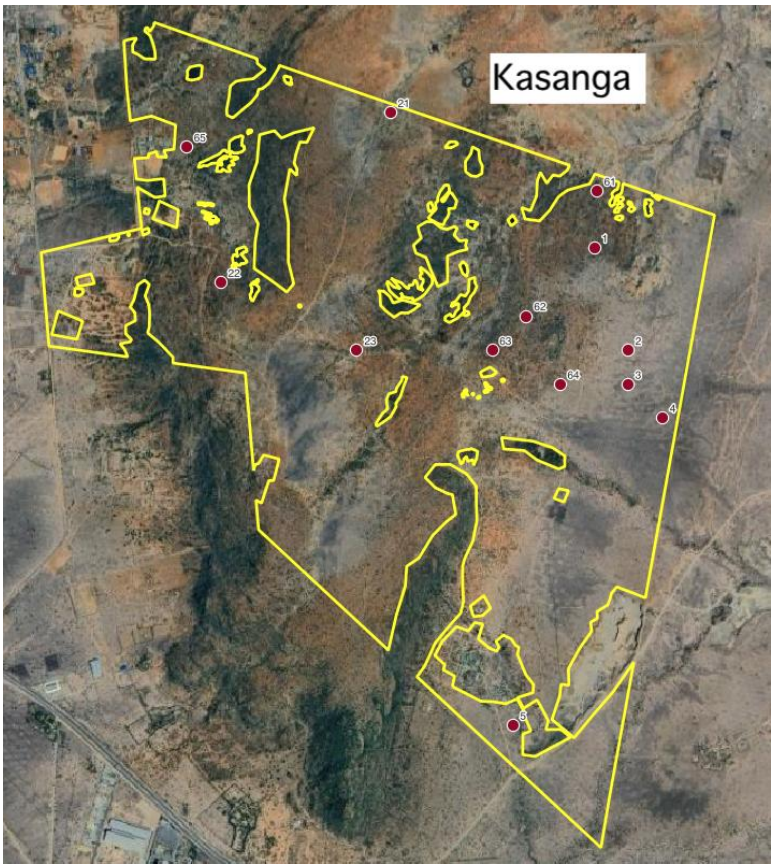
1. Ground samples are not collected by PP during validation; instead, PP intends to conduct ground sampling independently during verification for the months of January and February. In addition to this PP will be required to explicitly provide a data collection plan and number of samples collected within the project activity area in the technical document.

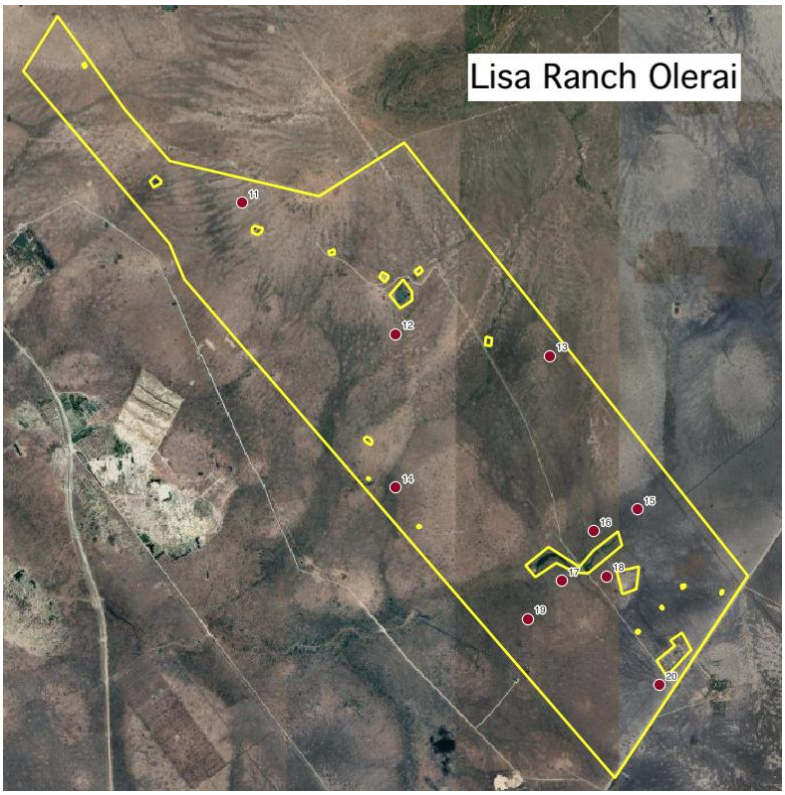
Response: For the verification soil samples the following procedures are implemented. In the case of the SOCwt%, soil samples are taken from demarked geocoded locations at a depth of 30cm with augers and then transported within 2-3 days to the collection facility of the testing lab used, for a dry combustion analysis of SOCwt%. In the case of BD, measurements are made near the field by the ground team, using the soil samples immediately after sampling.

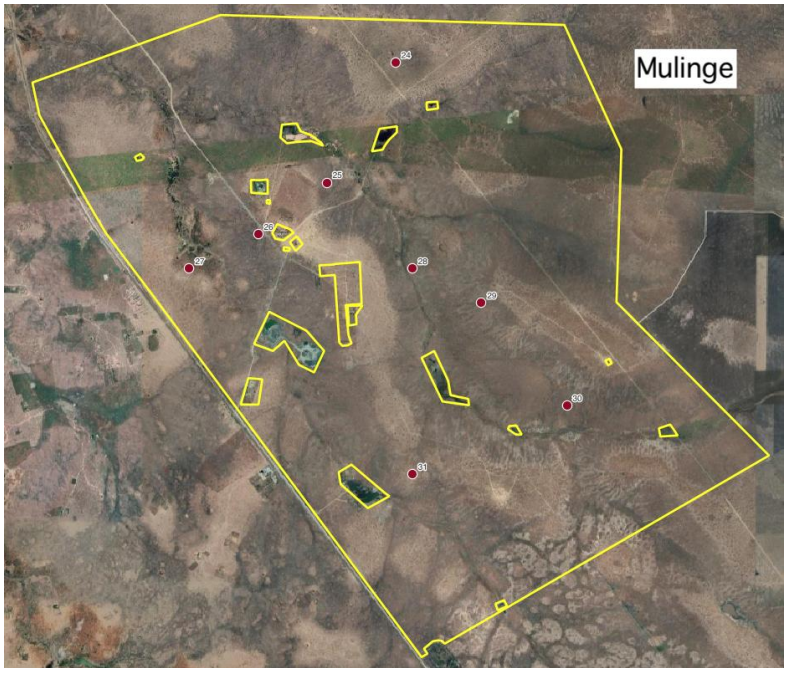
Soil sampling locations are selected using a stratification based on the soil textures found within the project areas. The reason for this type of stratum is that the purpose of the soil sampling is primarily for the QA/QC of the remote sensing technology. Based on the scientific framework presented in Section 3 of the remote sensing report provided to the VVB and Verra, some of the main parameters affecting the physical process are the parameters having to do with the soil texture. Hence, we must ensure during soil sampling that all the soil textures in the project are individually sampled to the necessary level.

Within each such soil texture stratum found within the project, the required number of soil sample locations is selected randomly with GIS software. The specific number of soil samples within each strata is determined as per the equations of Section 4.2.5 of the remote sensing report (ATBD) – the number is selected to ensure that a statistically significant correlation can be measured between the remote sensing measurements and the conventional sampling. It is necessary to establish such a statistically significant correlation to ensure that the outputs of the Boomitra remote sensing technology will ensure an accurate and conservative calculation of ERRs. In practice, the polygons in the project are subdivided into their respective soil texture strata on a pixel-by-pixel basis, and the sampling points are randomly selected from all pixels within that stratum. This means that the number of samples per polygon is random, but the number of samples per soil texture stratum is controlled.

The following locations (red circles) are selected following the stratified random sampling plan described above:




Lisa Ranch Olerai
11
12
13
14
15
16
17
18
19
20


Mulinge
24
25
26
27
28
29
30
31

2. A detailed plan and information regarding the bias correction of Emission Reductions (ERR) are needed. This correction should account for the difference between RothC estimations resulting from project activity intervention and those obtained from remote sensing data or vice versa for baseline scenario.

Response: Our approach to bias correction in the improved practice project RothC model scenario involves a careful calibration process to ensure accurate estimates of Emission Reductions (ERR). Specifically, we fit the carbon input parameter of the RothC model to align with soil carbon measurements obtained via remote sensing, at the beginning and end of the project monitorin period. This method effectively accounts for discrepancies between RothC estimations and remote sensing data, ensuring that the model's output reflects the actual changes in soil carbon resulting from the project activities. By integrating these remote sensing measurements into our calibration, we address potential biases and enhance the reliability of our ERR estimates.

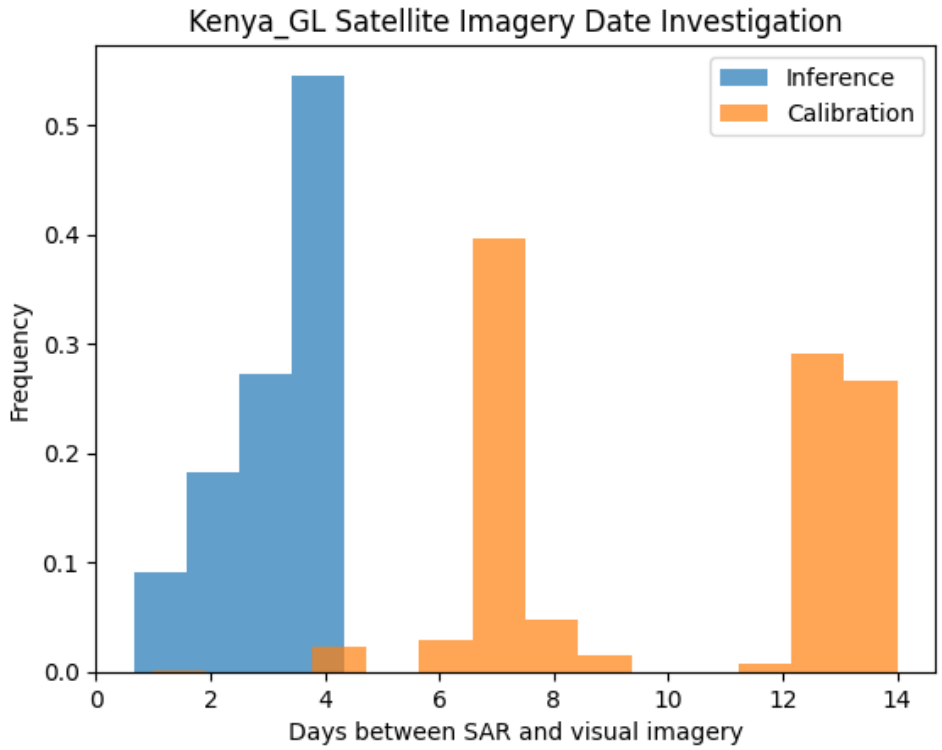
For the baseline scenario, bias correction can be accomplished by adjusting the RothC baseline change in carbon stock by the average bias measured from our literature validation set as documented in the Model Validation Report. However, our average bias on the literature dataset is 0.41 t/ha/year, indicating that our baseline RothC model bias is overestimating soil carbon stock gains. Subtracting this bias from our baseline scenario results on our project sites would in turn result in adding the bias to the calculation of emissions reduction, increasing the overall emissions reduction estimate of the project. Therefore, we believe it is more conservative in this case to refrain from adjusting the baseline scenario literature estimated bias in the ERR calculations. The Model Validation Report has been updated to reflect this finding.

3. As a result of temporal alignment issues observed in satellite data, there's a possibility of overestimations. PP is requested to furnish a revised model plan addressing the temporal alignment of satellite data to mitigate these issues.

Response: As a result of satellite revisit rates, it is unlikely that the multiple satellites used in Boomitra's soil carbon measurement approach will cover the same position in orbit on the exact same day. To account for this inherent discrepancy in satellite imagery dates, Boomitra has implemented quality assurance methods to ensure that the satellite imagery used for both model calibration and inference has minimal temporal misalignment.

For the model calibration dataset, while gathering satellite imagery for the soil samples that are used for training and testing Boomitra's soil carbon model, no imagery was permitted with a temporal discrepancy of greater than 14 days between the capture of SAR imagery and visible imagery. This ensures that Boomitra's model is not trained upon satellite imagery that exhibits significantly different surface reflectance values in the visible spectrum than the reflectance values present at the date of SAR imagery capture.

Additionally, it should be noted that the calibration dataset displays a wider range of date discrepancies than the data used for soil carbon inference. This is due to the preferred climatological conditions that are present during the temporal measurement window used for Boomitra's annual soil carbon measurements. As a result, the satellite data used for soil carbon measurements exhibits much lower average discrepancy between the dates of SAR imagery capture and visible imager capture. The histogram below displays the frequency of the size of date discrepancies in both the calibration and inference datasets. Boomitra's data quality assurance approach ensures that the data used for soil carbon measurement displays a conservatively small difference in collection dates and therefore minimizes the noise introduced by date discrepancies.



4. [*What is our*] Approach [*to*] soil data information for modelled soil moisture data or improved soil data information either ground based or other remote sensing data.

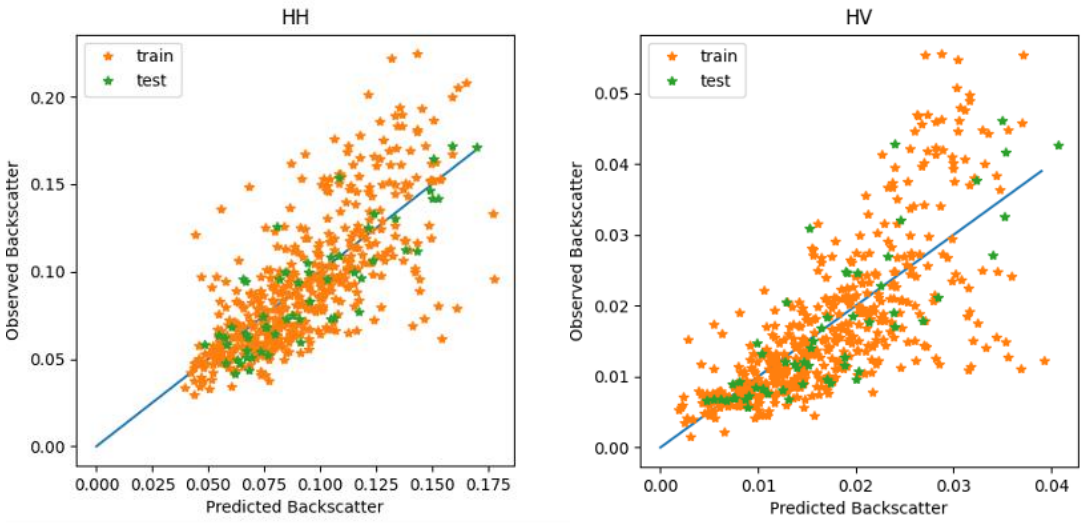
Response: For our soil carbon estimation model, we utilize the SMAP (Soil Moisture Active Passive) and SMOS (Soil Moisture and Ocean Salinity) soil moisture values. SMAP and SMOS provide high-resolution, global soil moisture data through advanced remote sensing techniques, combining both active and passive microwave measurements. Details of the methods and error associated with each satellite are described in Section 4.4.1 of the ATBD.

5. Regrettably, due to a lack of available data, a comprehensive assessment of the specific details regarding input errors couldn't be conducted. This needs to be critically examined at the time of verification.

Response: We have updated the Project Document (PD) to include a comprehensive analysis of the uncertainties in our remote sensing modeling results. Our Posterior Predictive Distribution (PPD) analysis covers both the modeling errors and the uncertainties associated with input measurements, detailing how these combined uncertainties can affect the variability of our output results. Although the specific details regarding input errors alone could not be individually assessed, the PPD analysis provides a thorough evaluation of the overall uncertainty under the assumption of an unbiased estimator.

6. Information and data for the comparison between ALOS-2 modeled data and bias-corrected data derived from Sentinel-1 predictions is needed at the time of verification.

Response: The underlying data used to produce the Sentinel-1 ALOS-2 interconversion as shown in the figure below has been shared with the VVB. We can include this data again in our submission at the time of verification.



7. The delineation challenges within the Kasanga ranch due to forested areas might lead to potential overestimations in ERR calculations. A thorough pixel-level examination will be crucial during the verification process to address this possibility.

Response: As can be seen in the polygon KML file, dense forested areas have now been removed from the Kasanga polygon. The pixel data from these areas of dense forest are now not used for the carbon calculations at all, because they have been clipped out, so there is now no chance for ERR overestimation due to forested areas. Forested areas were removed with a thorough pixel level analysis.

Table 4. FAR from this verification

FAR ID	01	Section No.		Date : 22/11/2023
Description of FAR				
Based on the raised CL and CAR during the audit findings, this FAR is raised. Remote sensing's overall ap proach for validation is accurate and aligned with the project's objectives and methodology however, it's c rucial to specifically examine the following points during verification: 1. Ground samples are not collected by PP during validation; instead, PP intends to conduct ground sampling independently during verification for the months of January and February. In addition to this PP will be required to explicitly provide a data collection plan and number of samples collecte d within the project activity area in the technical document. 2. A detailed plan and information regarding the bias correction of Emission Reductions (ERR) are n eeded. This correction should account for the difference between RothC estimations resulting fro m project activity intervention and those obtained from remote sensing data or vice versa for bas eline scenario. 3. As a result of temporal alignment issues observed in satellite data, there's a possibility of overesti mations. PP is requested to furnish a revised model plan addressing the temporal alignment of sa tellite data to mitigate these issues. 4. Approach soil data information for modelled soil moisture data or improved soil data information either ground based or other remote sensing data. 5. Regrettably, due to a lack of available data, a comprehensive assessment of the specific details r egarding input errors couldn't be conducted. This needs to be critically examined at the time of ve rification. 6. Information and data for the comparison between ALOS-2 modeled data and bias-corrected data derived from Sentinel-1 predictions is needed at the time of verification. 7. The delineation challenges within the Kasanga ranch due to forested areas might lead to potentia l overestimations in ERR calculations. A thorough pixel-level examination will be crucial during the verification process to address this possibility.			
Project participant response				**Date:** DD/MM/YYYY
Documentation provided by project participant				
VVB assessment				**Date:** DD/MM/YYYY

FAR ID	02	Section No.		Date: 22/11/2023
Description of FAR				
Based on provided proof of initiation of conversation between the PP and the local stakeholders, the CL# 24 and CL#25 are closed and FAR#02 is initiated. As mentioned by the PP, it is very important to include t he stakeholders in the project as participants if they are interested and all the issues raised by the stakeh olders should be satisfactorily resolved before the verification.				
Project participant response				**Date :** DD/MM/YYYY
Documentation provided by project participant				
VVB assessment				**Date:** DD/MM/YYYY

FAR ID	03	Section no.	NA	Date : 24/03/2025
Description of FAR				

During validation, the assessment of the remote sensing AI model's calibration, validation, and uncertainty quantification identified the need for further substantiation of its accuracy and robustness. While initial assessments have been conducted, additional demonstration is required to ensure that the model's predictions are statistically reliable, unbiased, and incorporate comprehensive error propagation methodologies.

To establish the validity of the model, its predictions should be benchmarked against in-situ soil samples collected through representative sampling in the project area. Specifically, the model should demonstrate:

- Sufficient prediction coverage, ensuring that at least 90% of validation data falls within 90% prediction intervals, confirming alignment between predicted and observed values.
- Good model fit, where $R^2 > 0$ for all paired observations, indicating a meaningful correlation between predicted and observed SOC values.
- Minimal bias, ensuring that the model's prediction error is not significantly different from zero under a two-tailed, one-sample t-test, confirming that systematic overestimation or underestimation is not present.

Additionally, refinements in Monte Carlo-based error propagation are necessary to capture spatial dependencies in SOC stock predictions. This includes:

- Accounting for covariance in predictive distributions by parameterizing a multivariate normal distribution ($X \sim N(\mu, \Sigma)$), where:
    - X represents SOC stock values across prediction units,
    - μ is the mean vector of SOC stock values, and
    - Σ is the covariance matrix describing spatial dependence, estimated through variogram fitting.

Furthermore, uncertainty quantification must incorporate contributions from both the biogeochemical model and the remote sensing AI model. The IME model validation report should ensure that uncertainties from both models are systematically integrated, ensuring accurate error propagation within the biogeochemical model. It is essential that the input uncertainties from the AI model are properly accounted for, as they directly influence the overall reliability of the biogeochemical model's outputs.

Given these considerations, this Forward Action Request (FAR) has been raised at the validation stage. It will be assessed during the first verification to determine whether the project has provided sufficient evidence to support the accuracy, reliability, and robustness of the remote sensing AI model for SOC stock estimation.

Project participant response	**Date :** DD/MM/YYYY
Documentation provided by project participant	
DOE assessment	**Date:** DD/MM/YYYY

History of the document						
Version	Date	Nature of Revision	Prepared by		Reviewed by	
			Name	Date	Name	Date
0	01/10/2022	Initial adoption	Shifali Guleria	01/10/2022	Deepika Mahala	01/10/2022

Annexure I: Patchy vegetation with the project area


GPS Map Camera
, Machakos County, Kenya
Kinanie, Kenya
Lat -1.450406° Long 37.078892°
28/10/23 05:12 PM GMT +03:00

Annexure II: Rocky patches with the project area


GPS Map Camera
, Machakos County, Kenya
Kinanie, Kenya
Lat -1.450362° Long 37.078832°
28/10/23 05:20 PM GMT +03:00