

## Final Project Verification Report Solidaridad Uganda

**Name of Reviewers:**

Pablo Rodríguez-Noriega (Senior internal reviewer of the initial verification assessment, and lead auditor of the verification assessment of the open CAR in the initial verification)

**Audit team initial verification assessment:**

Andrew Mbogholi (Lead auditor)

Steve Ngapout (Trainee auditor)

**Date of Review:** 12 December 2025

**Project Name:** Solidaridad Uganda - Adoption of Agroforestry among smallholder coffee farmers under the Practice for Chance coffee program).

**Project Description:**

The project involves Ugandan smallholder independent coffee producers who have recently begun the transition to agroforestry practices but do not have the technical resources and skills or finances to successfully operate a long-term agroforestry system.

The project aims to increase the quality and productivity of farmer output, adapt the farmland to build resilience to climate change, avoid deforestation, and reduce and sequester carbon. Majority of these smallholder farmers (participants) significantly lack the income, resources, and capacity to develop agroforestry projects by themselves. This is due to high poverty levels among farmers that ranges from 30 to 40%, with over 50% of family households having an income of <1 USD a day.

The Local partner (Solidaridad Eastern Central Africa - Uganda) provide farmers with agroforestry advice, capacity development and sensitization, (tree species) planting materials, and the necessary infrastructure for the implementation of the agroforestry practices. Farmers are expected to receive carbon credits from Acorn (Rabobank) which will allow them to afford the necessary materials needed for the long-term maintenance of their agroforestry system. The agroforestry system design incorporates the trees in coffee farms. Tree species included are *Cordia africana*, *Albizia coriaria*, *Artocarpus heterophyllus*, *Ficus natalensis*, *Mangifera indica*, *Persea americana*, and *Grevillia robusta*. The first trees were planted by the initial lead farmers in late 2017.

The project is carried out in Arua, Gulu, Kasese, Masaka, Mbale, Mityana, Mubende, and Nebbi districts of Uganda.

At the time of project verification, the total number of onboarded farms with CRUs calculated was 17,075 with a total area of 11,743.01 ha, and a total amount of CRUs generated of 15,510 (crediting period from 27<sup>th</sup> November 2021 to 1<sup>st</sup> December 2023).

**List of Principal documents reviewed:**

- Project ADD
- Laws/regulations/policies:
  - National Adaptation Plan for the Agricultural Sector, 2018
  - National Climate Change Act, 2021
  - National Forestry and Tree Planting Act, 2003
  - National Forestry Policy 2001
  - The Data Protection and Privacy Act, 2019
  - The Data Protection and Privacy Regulation, 2021
  - Updated NDC of Uganda, 2022
- Agreements: Participant Agreement & Farmer consent form
- Land ownership documents
- Project Business Case
- Evidence of participants' training activities
- Project Council meetings minutes
- Participants' database
- Solidaridad Uganda registration document (legal entity)
- Solidaridad Human resource (employment) policy manual
- Farmer payments
- Remote sensing process description
- Excel files:
  - Solidaridad Uganda\_Verification Data Package
  - METADATA Verification Data Package.

**Visited sites:**

Plot ID	Farmer ID	Plot Area (ha)	Sampling Day	District	Geolocation	
					Latitude	Longitude
UG166322 - 236116	UGABZ812_1	0.28	12/19/2023	Mbale	██████	██████
UG166609 - 236978	UGACA444_1	0.235	12/19/2023	Mbale	██████	██████
UG169514 - 245693	UGACH179_1	0.191	12/19/2023	Mbale	██████	██████
UG166679 - 237188	UGACA619_1	0.295	12/19/2023	Mbale	██████	██████
UG051840 - 64646	UGABG468_1	1.569	12/20/2023	Masaka	██████	██████
UG050567 - 63376	UGAAO006_1	2.107	12/20/2023	Masaka	██████	██████
UG062842 - 77637	UGAAU427_1	0.472	12/20/2023	Masaka	██████	██████
UG062195 - 76991	UGAAS612_1	0.443	12/20/2023	Masaka	██████	██████
UG044638 - 57000	PM_1972703549436_1	1.235	12/21/2023	Mityana	██████	██████
UG045248 - 57619	UGAAB162_1	0.517	12/21/2023	Mityana	██████	██████

UG045245 - 57618	UGAAB161_1	0.441	12/21/2023	Mityana	████	████
UG044481 - 56831	JM_1943784102458_1_0	0.356	12/21/2023	Mityana	████	████

**Ground truth data plots visited and measured:** the Validation and Verification site visit of this project was done just after the Validation and Verification site visits of the Trees for Kenya and Farm Africa projects. In the 3 projects, the same entity has performed the Ground Truth Data collection. During the 3 site visits, as part of the verification process, some of the plots used for the development of the remote sensing model were visited:

- Uganda
  - GTD subplot ID Mugerwa Lawrence\_4d in the farm: UG051840 - 64646
- Kenya
  - GTD ID: KEN\_TreesforKenya\_20230130\_139218\_5. 2 subplots were measured and another one visited.
  - GTD ID: KEN\_TreesforKenya\_20230131\_178462\_30. 1 subplot measured.
  - GTD plots between plots IDs: KE068012 – 82824 and KE067854 – 82662

**List of individuals interviewed:**

**Solidaridad Uganda staff:**

- [REDACTED] – Senior Project Manager
- [REDACTED] – Data officer
- [REDACTED] – Finance coordinator
- [REDACTED] – Project Officer
- [REDACTED] – Project Monitoring and Evaluation officer

**Project council members:**

- [REDACTED] – Secretary (Mbale)
- [REDACTED] – Vice chairperson (Masaka)
- [REDACTED] – Vice chairperson Project council (Greater Mubende, Kassanda & Mityana)
- [REDACTED] – Secretary Project council (Greater Mubende, Kassanda & Mityana)

**Other stakeholders:**

- [REDACTED] – District Natural Resources Officer (Mityana)
- [REDACTED] – Chairperson Bushika Integrated Area Farmers' cooperative (Mbale)
- [REDACTED] – Opinion leader (local community spokesperson, Mbale)
- [REDACTED] – Director Ndugu Farmers' cooperative society (Masaka)

**Promoter (Lead) Farmer:**

- [REDACTED] (Mityana)

**Field Technician (Agronomist):**

- [REDACTED] (Mbale)
- [REDACTED] - Ndugu Farmers' cooperative society (Masaka)

**Project participants (interviewed and farm visited):** 12 farmers interviewed. Confidential information

**Description of field visit:**

The field visit was a 5-day onsite work, interviewing the local partner, project participants and other stakeholders, and visiting project farms and nurseries, as described in the following table.

Activity	Location	Date/time
Meeting with Solidaridad Uganda local staff and local stakeholders: <ul style="list-style-type: none"> <li>▪ [REDACTED] [REDACTED] – Chairperson Bushika Integrated Area Farmers’ cooperative (Mbale).</li> <li>▪ Solidaridad staff ([REDACTED]).</li> </ul>	Mbale	18 Dec 2023
Farm visits: <ul style="list-style-type: none"> <li>▪ UG166679 - 237188</li> <li>▪ UG166322 - 236116</li> <li>▪ UG166609 – 236978</li> <li>▪ UG169514 – 245693</li> </ul>	Farmers plots, Mbale district	19 Dec 2023
Meeting with project council member and stakeholder <ul style="list-style-type: none"> <li>▪ [REDACTED] – Secretary (Mbale)</li> <li>▪ [REDACTED] [REDACTED] – Opinion leader (local community spokesperson, Mbale)</li> </ul>	Mbale town	19 Dec 2023
Meeting with project council member and stakeholder <ul style="list-style-type: none"> <li>▪ [REDACTED] – Vice chairperson (Masaka)</li> <li>▪ [REDACTED] – Director Ndugu Farmers’ cooperative society (Masaka)</li> <li>▪ [REDACTED] Ndugu Agronomist for the cooperative society</li> </ul>	Ndugu Farmers’ cooperative society, Masaka district	20 Dec 2023
Farm visits: <ul style="list-style-type: none"> <li>▪ UG050567 – 63376</li> <li>▪ UG051840 – 64646</li> <li>▪ UG062842 – 77637</li> <li>▪ UG062195 – 76991</li> </ul>	Farmers’ plots, Masaka district	20 Dec 2023
Farm visits: <ul style="list-style-type: none"> <li>▪ UG044638 - 57000</li> <li>▪ UG045248 - 57619</li> <li>▪ UG045245 - 57618</li> <li>▪ UG044481 - 56831</li> </ul>	Farmers’ plots, Mityana district	21 Dec 2023
Meeting with project council member and stakeholder: <ul style="list-style-type: none"> <li>▪ [REDACTED] – Vice chairperson Project council (Greater Mubende, Kassanda &amp; Mityana)</li> <li>▪ [REDACTED] – Secretary Project council (Greater Mubende, Kassanda &amp; Mityana)</li> <li>▪ [REDACTED] [REDACTED] – District Natural Resources Officer (Mityana)</li> </ul> Conversation with Promoter farmer: <ul style="list-style-type: none"> <li>▪ [REDACTED]</li> </ul>	At Christine Nakawesi Farm (UG045248 – 57619).	21 Dec 2023
Review of the documents with Solidaridad Uganda staff.	Solidaridad Uganda offices, Kampala.	22 Dec 2023
Closing meeting		

**Verification Opinion:**

It can be concluded that the project meets all the verification requirements of the Acorn Framework and Methodology (**Positive Verification Opinion**).

Note: The verification assessment was concluded on August 30, 2024, with an open Corrective Action Request (CAR). As a result, a positive verification opinion could not be issued at that time. In August 2025, Acorn submitted a new response to the open CAR along with updated evidence, including revised GHG calculations (Solidaridad Uganda\_Verification Data Package).

Based on the new submission, the VVB conducted a follow-up verification assessment focused specifically on the unresolved CAR. On September 3, 2025, the VVB determined that the CAR could be closed and issued a positive verification opinion for the project. However, some updates were required in the files: “Solidaridad Uganda Verification Data Package” and “Remote sensing process description Sol Uganda” to confirm the final project CRUs. This information was provided on November 27, 2025 and assessed by the VVB on December 12, 2025 confirming that the updates were correctly performed.

*Table 1. Summary of draft report on Corrective Actions*

Theme	CARs	NIRS	PCARs
Applicability conditions	0	0	0
Biomass measurement	CAR 01/24 (Closed)	0	0
<b>TOTAL</b>	<b>1 (closed)</b>	<b>0</b>	<b>0</b>

*Table 2– Summary of open Forward Actions (if any)*

Forward Action Requirement (FAR)	Description	Process to Resolve	Time Frame to be Closed By
N/A	N/A	N/A	N/A

*Table 3 – Assessments requested by reviewers from ADD and/or technical specification review process*

Relevant requirements within Methodology	Description of concern	Validator comments	Corrective actions (if any)	ACORN response	Resolved?
N/A	N/A	N/A	N/A	N/A	N/A

# Methodology requirements to assess

## Theme: Applicability Conditions

Section 4 applicability condition a			
<b>A. Requirement:</b>	<i>The project intervention meets the agroforestry definition (see Section 3), and any trees planted are native or naturalized species.</i>		
<b>B. Guidance Notes for Validators</b>	<p>Please give an opinion as to whether the concept of agroforestry is followed or pursued and tree species being planted meet these criteria. This can be checked using a number of sources:</p> <ul style="list-style-type: none"> <li>• Visual observations of local tree-growing practices</li> <li>• Discussions with farmers, communities, and project staff</li> <li>• Discussions with local experts (forestry and biodiversity experts)</li> </ul> <p>Published information (refer to this in the validation report if used)</p> <p>Through interviews with Local Partner and participants, assess whether the Local Partner promotes the use of native species in agroforestry systems.</p>		
<b>C. Findings (describe)</b>	<p>Findings of requirement 4.1.7 of the Validation report:</p> <p><i>“All tree species that are being promoted by Solidaridad Uganda in the agroforestry project are either native or naturalized. Examples of the tree species include Cordia africana, Albizia coriaria, Artocarpus heterophyllus, Ficus natalensis, Mangifera indica, Persea americana, and Grevillia robusta. During the field visit, these tree species were observed to be occurring in the project areas. These tree species provide various benefits to the livelihood of the farmers (e.g., provision of shade for coffee crop thus improved yields, improvement of soil fertility, fruits (nutrition), and improved financial income). Although not all project participants have received tree species from the project, it was observed that all farmers have trees in their farms, notably the species that are promoted by local partner. The tree species Cordia africana is native to Africa</i></p> <p><i>(<a href="https://apps.worldagroforestry.org/treedb/AFTPDFS/Cordia_africana.PDF">https://apps.worldagroforestry.org/treedb/AFTPDFS/Cordia_africana.PDF</a>), while others occur naturally e.g., Albizia coriaria.</i></p> <p><i>(<a href="https://apps.worldagroforestry.org/usefultrees/pdflib/Albizia_coriaria_UGA.pdf">https://apps.worldagroforestry.org/usefultrees/pdflib/Albizia_coriaria_UGA.pdf</a>)”.</i></p> <p>The project activity consist on the implementation and improvement of agroforestry practices, planting tree in already existing agroforestry/agriculture lands.</p>		
<b>D. Conformance</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>

E. Corrective Actions (describe)	None
F. Acorn's Response (if applicable)	N/A
G. Status (if applicable)	N/A
H. Forward Actions (describe, if applicable)	None
I. Others	None

Section 4 applicability condition b							
A. Requirement:	<i>The project area must not have been cleared of native vegetation within 5 years of the start of the project intervention.</i>						
B. Guidance Notes for Validators	<p>Assess the evidence to demonstrate that the land was not cleared prior to the project intervention. If:</p> <ol style="list-style-type: none"> <li>The evidence provided by satellite imagery that shows the absence of trees in the smallholder land at T-5 (5 years prior to the smallholder joining the project), confirms that the satellite image used appears to match the smallholder land that it is ascribed to.</li> <li>The evidence provided through other forms of proof, assess the accuracy of this proof by e.g. speaking to the smallholder and communities.</li> <li>If b, assess an appropriate number of smallholder plots whose evidence was provided through non-satellite-imagery means, i.e. other forms of proof.</li> <li>If the Local Partner confirms that deforestation has occurred 5 years prior to the start of project activities: Confirm whether the deforestation was caused by the perverse incentive to later claim CRUs and give an opinion as to whether, based on the Local Partner's mitigation measures, it is likely to occur again.</li> </ol>						
C. Findings (describe)	<p>Findings of requirement 4.1.2 and 5.1.1 of the Validation report:</p> <p><i>"Review of documents such as ADD, and T-5 analysis indicated that the local partner ensured that land was not deforested in the last five years. A verification was conducted and the farms that were confirmed as been deforested were not included in the project. The information on deforestation was also corroborated through interviews with sampled participants (smallholders) who confirmed that deliberate deforestation has not occurred in the project farms. This was also noted through observations during field visits."</i></p>						
D. Conformance	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">Yes</td> <td style="width: 33%; text-align: center;">No</td> <td style="width: 33%; text-align: center;">N/A</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	Yes	No	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yes	No	N/A					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
E. Corrective Actions (describe)	None						

F. Acorn's Response (if applicable)	N/A
G. Status (if applicable)	N/A
H. Forward Actions (describe, if applicable)	None
I. Others	None

Section 4 applicability condition c		
A. Requirement:	<i>The project area consists of individual plots that are between 0.1 and 10 ha.</i>	
B. Guidance Notes for Validators	Prior or during the site visit, the validator can check that the areas of sampled project sites are less than 10 ha via the remote-sensing polygons previously obtained by Acorn. If, when visiting the site, the boundary of the polygon appears to map appropriately onto the boundary of the smallholder's land, then the smallholder's land is likely less than 10 ha.	
C. Findings (describe)	As stated in the ADD, confirmed in the GIS file that includes the polygons of the project parcels, and confirmed during the site visit (in the interviews with the farmers and in the GPS measurements) all project parcels are between 0.1 and 10 ha. (See also findings of requirement 4.2.2. in the Validation report).	
D. Conformance	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/> N/A <input type="checkbox"/>
E. Corrective Actions (describe)	None	
F. Acorn's Response (if applicable)	N/A	
G. Status (if applicable)	N/A	
H. Forward Actions (describe, if applicable)	None	
I. Others	None	

Section 4 applicability condition d	
A. Requirement:	<i>All land within the project area is either cropland or degraded land and not on wetlands in the baseline scenario.</i>
B. Guidance Notes for Validators	Prior or during the site visit, the validator can check on what type of land the areas of sampled project sites are located and are in line with the land cover assessment information previously obtained by Acorn in the leakage assessment.

	<ul style="list-style-type: none"> <li>Give your opinion on whether activities are taking place, and/or have taken place, on land that is degraded, damaged or destroyed or existing cropland.</li> <li>Give your opinion on whether you believe that the activities being employed by the project participants will enhance/improve the land.</li> </ul> <p>This may be assessed during visits to project sites and discussions with project participants and staff of the local coordinating organization.</p>			
<b>C. Findings (describe)</b>	During the field, in the document review, and in the interviews with different stakeholders, enough evidence was gathered to confirm that project lands were agroforestry or agricultural lands when the project started. The project activity consists basically of planting trees to create and/or improve an agroforestry system, contributing to the enhancement of the land (i.e. improve and diversify crop production, improve soil quality, and reduce soil erosion). No wetlands were identified during the visit and based on the reviewed documentation, the project boundary does not include wetlands.			
<b>D. Conformance</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">Yes <input checked="" type="checkbox"/></td> <td style="width: 33%; text-align: center;">No <input type="checkbox"/></td> <td style="width: 33%; text-align: center;">N/A <input type="checkbox"/></td> </tr> </table>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>		
<b>E. Corrective Actions (describe)</b>	<i>None</i>			
<b>F. Acorn's Response (if applicable)</b>	<i>N/A</i>			
<b>G. Status (if applicable)</b>	<i>N/A</i>			
<b>H. Forward Actions (describe, if applicable)</b>	<i>None</i>			
<b>I. Others</b>	<i>None</i>			

<b>Section 4 applicability condition e</b>	
<b>A. Requirement:</b>	<i>The project interventions must not include activities that increase the total number, weight or number of grazing days for any livestock type, relative to the baseline scenario.</i>
<b>B. Guidance Notes for Validators</b>	During site visits and interviews with the smallholders, check with the smallholders whether the activities of the project, or income from the project, have or will likely result in an increase in their total number, weight or number of grazing days for any livestock type.

C. Findings (describe)	During the site visit and in the interviews with project participants it has been confirmed that most of the visited farmers have grazing animals (mainly cows and goats) in the project area. The number of animals per farm is usually 1-3 cows and 1-10 goat/sheep, and this livestock seems to be for family consumption. In the plots visited, these animals are stabled or confined and are fed with fodder obtained on the farm, from fodder crops and pruning material from planted trees. No evidence was gathered that the project activity may contribute to an increase in grazing activities. The main activity in the project parcels is agriculture (e.g. coffee, cassava, corn,...). Livestock activity is secondary, and farmers did not show any interest in increasing the number of animals.		
D. Conformance	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
E. Corrective Actions (describe)	<i>None</i>		
F. Acorn's Response (if applicable)	<i>N/A</i>		
G. Status (if applicable)	<i>N/A</i>		
H. Forward Actions (describe, if applicable)	<i>None</i>		
I. Others	<i>None</i>		

Section 4 applicability condition f	
A. Requirement:	<i>The project intervention must not include the planned harvesting of planted trees during or after the crediting period.</i>
B. Guidance Notes for Validators	During interviews with the smallholders, gauge the participants' likelihood of cutting down any trees during or after the crediting period. If they plan to cut trees after the crediting period, check whether the trees will be planted trees or pre-project trees. Avoid leading questions.
C. Findings (describe)	<p>During the validation/verification process it was evidenced that harvesting is not planned in the project. This is clear for the local partner, as discussed with Solidaridad Uganda staff, and is indicated in the Participants Agreement. However, during the interviews with the farmers, some of them (25%) mentioned that part of the planted trees will be used for fuel wood or timber. It is a common practice in the area that farmers plant timber trees for fuel wood production; they do frequent pruning and they also harvest the trees with this objective. This type of tree is planted at high densities (usually in rows in the plot limit every 1-2 meters) and is replanted after harvesting.</p> <p>It was corroborated during the visit that the project is sensitizing the farmers about this issue, and it is clear to the validation/verification team that harvesting is not a planned project activity. The local partner understands that, even though harvesting is not planned, there is a logging risk, and it has</p>

	<p>been identified in Part L of the ADD (Reversal Risk Assessment). However, as indicated in the NIRS 02/23 of the Validation Report, Part L (Reversal Risk Assessment) of the ADD shall be updated to reflect the actual risk of logging by participants and Risk mitigation actions shall be reviewed as well.</p> <p>These findings in the validation report were closed in the Final Validation Report once Acorn updated the ADD.</p>		
<b>D. Conformance</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
<b>E. Corrective Actions (describe)</b>	<i>None</i>		
<b>F. Acorn's Response (if applicable)</b>	<i>N/A</i>		
<b>G. Status (if applicable)</b>	<i>N/A</i>		
<b>H. Forward Actions (describe, if applicable)</b>	<i>None</i>		
<b>I. Others</b>	<i>None</i>		

<b>Section 4 applicability condition g</b>			
<b>J. Requirement:</b>	<i>Heavy machinery must not be used for site preparation or management.</i>		
<b>K. Guidance Notes for Validators</b>	Ask Local Partner about use of heavy machinery and note any sightings of heavy machinery in and around project areas.		
<b>L. Findings (describe)</b>	Interviewed farmers confirmed that tree planting was done and will be done manually. Heavy machinery has not been observed in the project area nor signs of its use. Likewise, considering the final expected planting density and the characteristics of the project sites (e.g. with current perennial crops) it will not be feasible to use heavy machinery in terms of access and costs.		
<b>M. Conformance</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
<b>N. Corrective Actions (describe)</b>	<i>None</i>		
<b>O. Acorn's Response (if applicable)</b>	<i>N/A</i>		
<b>P. Status (if applicable)</b>	<i>N/A</i>		
<b>Q. Forward Actions (describe, if applicable)</b>	<i>None</i>		
<b>R. Others</b>	<i>None</i>		

<b>Section 4 applicability condition h</b>			
<b>A. Requirement:</b>	<i>The project intervention must not increase the use of synthetic (nitrogen-containing) fertilizers relative to the baseline scenario.</i>		
<b>B. Guidance Notes for Validators</b>	Ask Local Partner and participants about use of synthetic fertilizers. Also note any sightings of synthetic fertilizer containers in and around project areas.		
<b>C. Findings (describe)</b>	<p>Interviewed farmers confirmed that they do not use synthetic fertilizers for the planted trees. They use fertilizers for their crops and other type of agricultural activities, but not for project trees. It does not seem to be a common practice in the area to use synthetic fertilizers when planting trees.</p> <p>In the nurseries they use organic fertilizers and no evidence of other fertilizers used has been found.</p>		
<b>D. Conformance</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
<b>E. Corrective Actions (describe)</b>	<i>None</i>		
<b>F. Acorn's Response (if applicable)</b>	<i>N/A</i>		
<b>G. Status (if applicable)</b>	<i>N/A</i>		
<b>H. Forward Actions (describe, if applicable)</b>	<i>None</i>		
<b>I. Others</b>	<i>None</i>		

## Theme: Biomass Measurement

### Section 6 Carbon Baseline pre-project tree adjustment factor

#### A. Requirement:

If the potential change in pre-project tree biomass is less than 5% of the expected increase in tree biomass expected to result from the project intervention, estimated using an appropriate tree or stand growth models, the carbon stock aboveground and belowground biomass of pre-project trees can be set at zero in the baseline scenario. Otherwise, measurements from sample plots must be used to define an appropriate adjustment factor with Equation 1 to Equation 3 and Table 3.

$$EETB_{y,s} = \frac{\sum_{i=1}^n \left( \frac{(ETB_{y,s} - ETB_{y,s=0})}{(TB_{y,s} - ETB_{y,s=0})} \cdot 100 \right)_i}{n}$$

Equation 1

Where:

$EETB_{y,s}$  = Estimated percentage change in tree biomass in year  $y$  that is attributed to pre-project trees, for plots in stratum  $s$

$ETB_{y,s}$  = Existing tree biomass in sample plot in stratum  $s$ ,  $y$  years after the start of the project intervention (t CO<sub>2</sub>eq)

$ETB_{y,s=0}$  = Existing tree biomass in sample plot in stratum  $s$  at the start of the project intervention (t CO<sub>2</sub>eq)

$TB_{y,s}$  = Tree biomass in sample plot in stratum  $s$ ,  $y$  years after the start of the project intervention in the sample plot (t CO<sub>2</sub>eq).

$n$  = Number of sample plots in stratum  $s$

$$U_{EETB_{y,s}} = \frac{1.645 \cdot \sigma}{\sqrt{n}} \cdot \frac{1}{EETB_{y,s}}$$

Equation 2

Where:

$U_{EETB_{y,s}}$  = Percentage uncertainty of  $EETB_{y,s}$  at a 90% confidence level

$\sigma$  = Standard deviation of  $\left( \frac{(ETB_{y,s} - ETB_{y=0,s})}{(TB_{y,s} - ETB_{y=0,s})} \cdot 100 \right)_i$  for all sample plots within stratum  $s$

$n$  = Number of sample plots in stratum  $s$

	$AdjU_{EETB_{y,s}} = 0.25 \cdot (U_{EETB_{y,s}} - 0.5)$ <p style="text-align: right;">Equation 3</p> <p>Where:</p> <p style="text-align: center;"><math>AdjU_{EETB_{y,s}}</math> = Adjustment for the uncertainty of <math>EETB_{y,s}</math></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #000080; color: white;"> <th style="padding: 5px;">Estimated change in existing tree biomass in stratum <math>s</math> after adjustment for uncertainty (<math>EETB_{y,s} + AdjU_{EETB_{y,s}}</math>)</th> <th style="padding: 5px;">Adjustment factor for baseline removal for plots in stratum <math>s</math> (<math>AdjB_s</math>)</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"><math>(EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 10\%</math></td> <td style="padding: 5px;">0%</td> </tr> <tr> <td style="padding: 5px;"><math>10\% &lt; (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 25\%</math></td> <td style="padding: 5px;">10%</td> </tr> <tr> <td style="padding: 5px;"><math>25\% &lt; (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 50\%</math></td> <td style="padding: 5px;">25%</td> </tr> <tr> <td style="padding: 5px;"><math>50\% &lt; (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 75\%</math></td> <td style="padding: 5px;">50%</td> </tr> <tr> <td style="padding: 5px;"><math>75\% &lt; (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 90\%</math></td> <td style="padding: 5px;">70%</td> </tr> <tr> <td style="padding: 5px;"><math>(EETB_{y,s} + AdjU_{EETB_{y,s}}) &gt; 90\%</math></td> <td style="padding: 5px;">100%</td> </tr> </tbody> </table>			Estimated change in existing tree biomass in stratum $s$ after adjustment for uncertainty ( $EETB_{y,s} + AdjU_{EETB_{y,s}}$ )	Adjustment factor for baseline removal for plots in stratum $s$ ( $AdjB_s$ )	$(EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 10\%$	0%	$10\% < (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 25\%$	10%	$25\% < (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 50\%$	25%	$50\% < (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 75\%$	50%	$75\% < (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 90\%$	70%	$(EETB_{y,s} + AdjU_{EETB_{y,s}}) > 90\%$	100%
Estimated change in existing tree biomass in stratum $s$ after adjustment for uncertainty ( $EETB_{y,s} + AdjU_{EETB_{y,s}}$ )	Adjustment factor for baseline removal for plots in stratum $s$ ( $AdjB_s$ )																
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$50\% < (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 75\%$	50%																
$75\% < (EETB_{y,s} + AdjU_{EETB_{y,s}}) \leq 90\%$	70%																
$(EETB_{y,s} + AdjU_{EETB_{y,s}}) > 90\%$	100%																
<p><b>B. Guidance Notes for Validators</b></p>	<p>Check the pre-project tree adjustment factor via the adjustment factor information provided prior by Acorn. Can this be justified/confirmed on a project level with what the validator sees during the fields visits?</p>																
<p><b>C. Findings (describe)</b></p>	<p>In this project case, as remote sensing is used for the monitoring of tree biomass, carbon baseline cannot be set as zero. Therefore, Acorn has estimated carbon baseline adjustment factor based on the Methodology (25%, as indicated in Part M.2 of the ADD).</p> <p>The adjustment factor for baseline removal (<math>AdjB</math>) has been calculated using growth models and not using measured data. This adjustment factor has been estimated by comparing project year 0 and year 30. The Estimated percentage change in tree biomass in year “<math>y</math>” that is attributed to pre-project trees (<math>EETB_y</math>) plus the Adjustment for the uncertainty of <math>EETB_{y,s}</math> (<math>AdjU_{EETB_{y,s}}</math>) was calculated to be between 25% and 50%. The current biomass changes in the first project years are mainly due to the growth of pre-existing trees. The use of an average adjustment factor for 30 years is not considered by the verification team a conservative approach for the first years of the project, when the biomass growth is slower, due to the sigmoid growth of the trees.</p> <p>Acorn has been asked to calculate the adjustment factor for baseline removal for the current project year, resulting in a 50%. Therefore, there is an important difference between the adjustment factor used in CRUs calculation (25%) and the adjustment factor calculated following the methodology (50%).</p>																
<p><b>D. Conformance</b></p>	<p>Yes <input checked="" type="checkbox"/></p>	<p>No <input type="checkbox"/></p>	<p>N/A <input type="checkbox"/></p>														

<p><b>E. Corrective Actions (describe)</b></p>	<p><b>CAR 01/24</b></p> <p>The adjustment factor for baseline removal (AdjB) shall be calculated following the methodology, for the verification year “y”. For example, if the biomass stock change and CRUs are calculated in project year 3, the baseline pre-project tree adjustment factor shall be calculated for this same year and all the parameters of equations 1, 2 and 3 (see above) shall be also for project year 3.</p> <p>If this CAR leads to a change in the adjustment factor, Acorn should update accordingly Part M of the ADD, the CRUs calculations in the Excel file “Solid Uganda_Verification Data Package” and the document “Remote sensing process description”.</p>
<p><b>F. Acorn’s Response (if applicable)</b></p>	<p>Acorn agrees to leave the report pending for now, as Acorn would like to require additional time to investigate the biomass distribution of the GT data used as input for the adjustment factor calculation.</p> <p><b>New response (9 August 2025):</b> Following a re-evaluation of our Pre-Project Tree (PPT) adjustment factor (now based on an annual application rather than 30-years) and incorporating insights from newly collected ground truth data, we have updated the PPT value to 50% for this project.</p> <p><b>Audit team final findings (3 September 2025):</b> Acorn has also updated the calculation of the adjustment factor for project year “y”, leading to the same Adjustment factor of 50%, instead of the initially used 0% and 25% (average value for 30 years). For the next verification period, the Adjustment factor will need to be recalculated, considering the new project year “y” and the actual number of planted trees, based on project implementation information. Based on this new finding, the audit team has decided to close the CAR.</p> <p><b>Audit team note (12 December 2025):</b> During the assessment of the open CAR an error was identified in the “Solidaridad Uganda Verification Data Package” and “Remote sensing process description Sol Uganda” files concerning final final project CRUs. These files were corrected and provided to the VVB by Acorn on November 27, 2025. The assessment of these documents confirmed that the CRUs are calculated according to the Acorn Methodology, and, therefore, the Draft Verification report was finished with a Positive opinion.</p>
<p><b>G. Status (if applicable)</b></p>	<p><b>Closed</b></p>
<p><b>H. Forward Actions (describe, if applicable)</b></p>	<p><i>None</i></p>
<p><b>I. Others</b></p>	<p><i>None</i></p>

## Section 7.1 Sample plots for ground truth data collection

<p><b>A. Requirement:</b></p>	<p><i>Data from sample plots are used to calibrate models for estimating tree biomass from satellite imagery. Sample plots used for model calibration must meet the following requirements:</i></p> <ol style="list-style-type: none"> <li>1. <i>Aboveground and belowground biomass of trees &gt;2m in height or with a DBH of more than 2.5 cm must be measured.</i></li> <li>2. <i>Sample plots must be within the same ecoregion and with land use similar to that of the plots to which the model will be applied.</i></li> <li>3. <i>The location of sample plots must be selected at random from sites that meet the applicability conditions</i></li> <li>4. <i>Tree biomass within sample plots can be measured using:</i> <ul style="list-style-type: none"> <li>• <i>The fixed area plot methodology described in Annex 1 of the Methodological tool: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (AR-TOOL14, v.4.2)</i></li> <li>• <i>The Acorn Standard Operating Procedures for Tree Inventory Plot Establishment and Measurement (Annex 3).</i></li> <li>• <i>Airborne or terrestrial LiDAR survey that meets the minimum requirements set out in Annex 4.</i></li> </ul> </li> </ol>
<p><b>B. Guidance Notes for Validators</b></p>	<p>During field visit(s) collect ground truth data Do the plots meet the above requirements and does it appear that the trees have been appropriately measured?</p>
<p><b>C. Findings (describe)</b></p>	<p>During the site visits of the three project in the region (Trees for Kenya, Farm Africa and Solidaridad Uganda), the audit team visited and measured some of the GTD plots and interviewed some of the field teams responsible for doing the GTD plots measurements. In these field visits the following findings were identified regarding ground truth data collection:</p> <p><b>Field measurements:</b> during the GTD collection, the verification team visited, together with Acorn staff (Acorn team), several field teams (project team) doing the GTD collection. During the visit, it was possible to interview some of the field workers of the project team, to measure some plots with them and to re-measure some plots with the Acorn team. The following findings were identified:</p> <ul style="list-style-type: none"> <li>• <b>Plot delineation:</b> in the visit during the GTD collection no errors in the delineation of the plot were identified.</li> <li>• <b>Field data collection:</b> in the interview with the project team staff collecting the data, three main findings were identified: <ul style="list-style-type: none"> <li>○ <b>Discrepancies/unclarity in the grouping of trees.</b> Not all trees are measured. When trees of the same species have similar heights they are grouped and then the number of trees of the group is recorded with the average height and DBH. The way the groups are done (e.g. every 1 m height difference) is not standardized and not included in the SOP. This affects the GTD final results.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Errors in tree height measurement: it was identified that tree height was not measured correctly. Although it was confirmed that field teams are trained and that there is a document (Acorn – AKVO ground truth data collection) containing the methodology for GTD collection, it was identified that in some cases height is not measured following the appropriate method included in the SOP.</li> <li>○ Errors in the identification/reporting of existing trees. During the visit some plots were re-measured together with Acorn team and it was confirmed that some tree/groups were not measured. In some cases, one species was not measured/reported, and in others, some individuals of a certain species were not measured/reported.</li> </ul> <p><b>Verification team remeasurement:</b> during the on-site visit, the verification team measured 5 GTD subplots. Measurements have been compared with the result of the GTD. The following findings were identified:</p> <ul style="list-style-type: none"> <li>● Species identification: the verification team identified tree species that were not measured by the project team.</li> <li>● Number of trees: in some plots, the verification team measured a different number of trees per plot than the project team</li> <li>● Total biomass: AGB using the Chave equation was calculated in one plot and the final results were different than the reported by Acorn.</li> </ul> <p>After the identification of these findings, Acorn has created an updated SOP document including quality assurance and quality control procedures that will be implemented in future field monitoring of GTD to prevent and/or minimize the above-described findings.</p> <p>The SOP document has been provided to the audit team. Section 3. “Quality assurance and control”, has been adapted based on IPCC Good Practice Guidance for LULUC and Forestry. Acorn has implemented an additional step incorporating high-resolution imagery and Lidar data.</p> <p>Acorn is continuously improving the ground truth data collection and the remote sensing model to increase the accuracy of calculations. The implementation of this new protocol will be confirmed in the next verification.</p>		
<b>D. Conformance</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
<b>E. Corrective Actions (describe)</b>	<i>None</i>		
<b>F. Acorn’s Response (if applicable)</b>	<i>N/A</i>		
<b>G. Status (if applicable)</b>	<i>N/A</i>		
<b>H. Forward Actions (describe, if applicable)</b>	<i>None</i>		

I. Others	Acorn is continuously improving the ground truth data collection and the remote sensing model to increase the accuracy of calculations. The implementation of the updated SOP, and specifically its Section 3 “Quality assurance and control”, will need to be confirmed in the next verification.
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## Section 7.2 Estimating change in tree biomass

A. Requirement:	<p>If tree biomass is estimated using satellite imagery, change in tree biomass must be calculated using Equation 5. This approach estimates the change in carbon stock in trees as the difference between two successive and independent carbon stock estimates.</p> $\Delta TB_{y,s} = (AGB_y - AGB_{y-1}) \cdot (1 + R) \cdot CF \cdot \frac{44}{12} \cdot (1 - AdjU)$ <p style="text-align: right;">Equation 5</p> <p>Where:</p> <p><math>\Delta TB_{y,s}</math> = Change in carbon stock in aboveground and belowground tree biomass in stratum <i>s</i>, in year <i>y</i> (t CO<sub>2</sub>eq) after uncertainty discount</p> <p><math>AGB_y</math> = Aboveground tree biomass per plot in year <i>y</i> (metric tons of dry matter)</p> <p><math>AGB_{y-1}</math> = Aboveground tree biomass per plot in year <i>y</i>-1 (metric tons of dry matter)</p> <p><i>R</i> = Root-shoot ratio to calculate the belowground biomass factor</p> <p><i>CF</i> = Carbon fraction of tree biomass</p> <p><math>\frac{44}{12}</math> = Conversion from carbon to carbon dioxide</p> <p><i>AdjU</i> = Adjustment factor for uncertainty</p>		
B. Guidance Notes for Validators	At desk review check whether above equation has properly been executed and result in real and measurable results.		
C. Findings (describe)	Based on the review of the provided Excel files with project GHG calculations (Solid Uganda_Verification Data Package) it can be confirmed that the calculation of the Change in carbon stock in aboveground and belowground tree biomass was performed following The Acorn Methodology V1.1. and its Equation 5. Regarding the use of the Adjustment factor for uncertainty, see findings in the next requirement “Section 7.3 Uncertainty adjustment factor”.		
D. Conformance	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
E. Corrective Actions (describe)	None		

F. Acorn's Response (if applicable)	N/A
G. Status (if applicable)	N/A
H. Forward Actions (describe, if applicable)	None
I. Others	None

### Section 7.3 Uncertainty adjustment factor

<b>A. Requirement:</b>	<p>The uncertainty value per project is calculated by Equation 7,</p> $U = \frac{CI_{\sigma}}{AGB_{\Delta x}}$ <p style="text-align: right;">Equation 7</p> <p>Where:</p> <p><i>U</i> = Project uncertainty for positive change of AGB within a measuring period</p> <p><i>CI<sub>σ</sub></i> = Half-width of a 90% confidence interval</p> <p><i>AGB<sub>Δx</sub></i> = The mean positive change in aboveground biomass for n number of plots</p> $CI_{\sigma} = 1.645 \frac{\sigma}{\sqrt{n}}$ <p style="text-align: right;">Equation 8</p> <p>Where:</p> <p><i>σ</i> = Standard deviation of positive change in AGB within a measuring period.</p> <p><i>CI<sub>σ</sub></i> = Half-width of a 90% confidence interval</p> <p><i>n</i> = refers to number of plots</p> <p>And if applicable equation 9, for U values greater than 50%.</p> $U_{adjF} = 0.25 * (U - 0.5)$ <p style="text-align: right;">Equation 9</p> <p>Where:</p> <p><i>U<sub>adjF</sub></i> = Adjustment factor for uncertainty (percentage)</p> <p><i>U</i> = Project uncertainty for positive change of AGB within a measuring period</p>
<b>B. Guidance Notes for Validators</b>	Check the uncertainty adjustment factor via the adjustment factor information provided prior by Acorn. Can this be justified/confirmed on a project level?

<p><b>C. Findings (describe)</b></p>	<p>During the verification process of the projects Trees for Kenya, Solidaridad Uganda and Farm Africa, a long methodological discussion took place. The verification team considered that the original uncertainty calculation approach followed by Acorn was not accurately representing the uncertainty of the remote sensing model and the uncertainty propagation in the calculation of stock changes.</p> <p>After this discussion process, the final agreed approach, by Plan Vivo, Acorn and the verification team, includes the following steps:</p> <p><b>Calculate project plot (farm) uncertainty (<math>U_y</math>)</b> following equation 7 of Acorn Methodology V1.0., where:</p> <ul style="list-style-type: none"> <li>• <math>AGB_y</math> and <math>AGB_{y-1}</math>: are the biomass in two points in time in each farm, estimated using the remote sensing model.</li> <li>• <math>u_y</math> and <math>u_{y-1}</math>: are the uncertainty values of the model (the same if the remote sensing model is the same at the two points in time). For the calculation of these model uncertainties equation 8 of Acorn methodology V1.0, and equation 8 of V1.1 – 2023 (errata) were used. <ul style="list-style-type: none"> <li>○ CI is calculated on validation AGB plot derived from GT data.</li> <li>○ GT data is collected at the time of model calibration. As prescribed by Acorn Methodology v1.0 section 7.1.4.2, a minimum of 20 plots is kept aside for model validation.</li> <li>○ CI is calculated using this validation set, and the modelled and measured values.</li> <li>○ The residual, which is the difference between predicted and measured AGB of the validation dataset, is used within the half-width of the confidence interval.</li> </ul> </li> </ul> <p><b>Calculate uncertainty adjustment factor per plot (AdjU):</b> based on the calculated <math>U_y</math> per plot and using Table 5 of Acorn Methodology V1.0.</p> <p><b>Calculate project uncertainty adjustment factor (AdjU):</b> although AdjU is calculated per plot (farm) a final project value is calculated at a project level and then applied per plot. This final adjustment factor is calculated by dividing the difference of the sum of GHG removals per plot with adjustment and without adjustment by the sum GHG removals per plot without adjustment. In this project the final project uncertainty adjustment factor is 17%, as confirmed after reviewing the last version of the Excel file “Solid Uganda_Verification Data Package” and of the document “Remote sensing process description Sol Uganda”.</p>		
<p><b>D. Conformance</b></p>	<p>Yes <input checked="" type="checkbox"/></p>	<p>No <input type="checkbox"/></p>	<p>N/A <input type="checkbox"/></p>
<p><b>E. Corrective Actions (describe)</b></p>	<p><i>None</i></p>		
<p><b>F. Acorn’s Response (if applicable)</b></p>	<p><i>N/A</i></p>		
<p><b>G. Status (if applicable)</b></p>	<p><i>N/A</i></p>		

H. Forward Actions (describe, if applicable)	None
I. Others	None

Section 8 Leakage adjustment factor	
A. Requirement:	<p>The leakage value per project is calculated by Equation 10,</p> $AdjL = P \cdot A \cdot LF \cdot 100$ <p style="text-align: right;">Equation 10</p> <p>Where:</p> <p><i>AdjL</i> = Adjustment factor for leakage (percentage)</p> <p><i>P</i> = The estimated reduction in productivity that will result from the project intervention, as a percentage of the productivity expected in the baseline scenario. If no change or an increase in productivity is expected, the score should be 0%</p> <p><i>A</i> = The proportion of the project area used to produce the most important product, or carry out the activity, that contributes to productivity in the baseline scenario, e.g. if half the plot is used to grow a specific crop the score should be 0.5</p> <p><i>LF</i> = Leakage factor for the type of land that production will be likely to shift to as a result of the project intervention: cropland or degraded land is '0' and forest land or wetland or organic soils<sup>1</sup> is '1'</p>
B. Guidance Notes for Validators	Check the leakage adjustment factor via the adjustment factor information provided prior by Acorn. Can this be justified/confirmed on a project level with what the validator sees during the field visits?
C. Findings (describe)	<p>As stated in the Validation report, in the findings of Requirements 4.6.1 &amp; 4.6.2:</p> <p><i>"The local partner has analyzed potential leakages and concluded that no major negative leakages are expected during the project lifespan. Increase in shade trees may affect yields of other crops such as beans. In this case, farmers may be forced to change the type of crop or cultivate beans in other areas of the farm. Some project participants rear livestock at small-scale level in their homesteads. During the field evaluation, it was noted that there is no farmers' activity that was likely to be displaced outside the project area."</i></p>

<sup>1</sup> [IPCC GPG LULUCF \(iges.or.jp\)](http://iges.or.jp)

D. Conformance	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
E. Corrective Actions (describe)	None		
F. Acorn's Response (if applicable)	N/A		
G. Status (if applicable)	N/A		
H. Forward Actions (describe, if applicable)	None		
I. Others	None		

### Section 9 Quantification of carbon benefits

A. Requirement:	<p>Carbon Removal Units (CRUs) are calculated using equation 11.</p> $CB_y = PR_y \cdot \frac{1}{1 + BP} \cdot (1 - AdjB_s) \cdot (1 - AdjL)$ <p style="text-align: right;">Equation 11</p> <p>Where:</p> <p><math>CB_y</math> = Carbon benefit for a plot in year <math>y</math> (t CO<sub>2</sub>eq)  <math>PR_y</math> = Carbon removal for a plot in year <math>y</math> (t CO<sub>2</sub>eq)  <math>BP</math> = Buffer pool percentage  <math>AdjB_s</math> = Adjustment factor for baseline removal for plots in stratum <math>s</math>  <math>AdjL</math> = Adjustment factor for leakage</p>		
B. Guidance Notes for Validators	Check number of CRUs calculated be justified/confirmed on a project level with what the validator sees during the field visits?		
C. Findings (describe)	Based on the review of the provided Excel files with project GHG calculations (Solid Uganda_Verification Data Package) it can be confirmed that the calculation of CRUs was performed following The Acorn Methodology V1.1. and its Equation 11. Regarding the use of the Adjustment factor for baseline removal see findings of requirement "Section 6 Carbon Baseline pre-project tree adjustment factor".		
D. Conformance	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
E. Corrective Actions (describe)	None		
F. Acorn's Response (if applicable)	N/A		
G. Status (if applicable)	N/A		

<b>H. Forward Actions (describe, if applicable)</b>	<i>None</i>
<b>I. Others</b>	<i>None</i>