OYU- REFORESTING UGANDA FOR A BETTER TOMORROW

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Prepared by	OYU GREEN PVT. LTD.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

'OYU - Reforesting Uganda for a Better Tomorrow' is a carbon sequestration project based in Uganda that falls under the Afforestation, Reforestation, and Revegetation (ARR) category of Agriculture, Forestry, and Other Land Used (AFOLU) projects. The project is targeting to increase the vegetation cover across 10,000 hectares of land in the Northern, Central, and Western regions of Uganda. The first instance of the project activity encompasses revegetation of 3324 ha land area spread across Northern, Central, and Western regions of Uganda.

This project seeks to empower private landowners who initially encountered investment limitations in establishing plantations. However, by strategically incorporating the sale of carbon credits, the scale of the revegetation initiative through tree plantation has experienced a substantial uplift. This enhancement not only addresses the previous limitations but also contributes to the broader objective of nurturing environmental sustainability. The selected land for the project activity is classified as degraded scrubland (2891.9 ha or 87%) and Cropland[1] (432.12 ha or 13%) before the implementation of the project.

The project aims to improve community resilience against the negative impacts of climate change via capacity building and establishing woodlands that improve their well-being and support the local environment. This project establishes a sustainable ecosystem by raising commercial tree species, specifically *Eucalyptus hybrid* (GU7 & GU8 – clones of Eucalyptus grandis x Eucalyptus urophylla; hereinafter referred to as Eucalyptus hybrid) and *Pinus caribaea* species, promoting biodiversity and environmental well-being. *Eucalyptus hybrid* and *Pinus caribaea* species stand out as prime options for carbon sequestration, possessing a higher capacity compared to other tree species[2]. This characteristic makes the project an effective and enduring solution in the efforts to address climate change.

[1] Detailed information on land use and land cover for the baseline year 2020 is provided in Section 3.4 including the conditions over the past 10 years that contributed to the transformation of the area into degraded land and cropland.

[2] https://www.researchgate.net/publication/314089763_The_economics_of_the_carbon_sequestration_potential_of_plantation_forestry_in_south_western_Uganda

The expected total GHG benefit for a 20-year crediting period (i.e. from 01-March-2021 to 28-February-2041) is 7,597,833 tCO2e, the Long-Term Average (LTA) benefit is estimated as 3,799,394 tCO2e (ex-ante) and updated as 1,017,275 tCO2e (ex-post) and the average annual Emission Removal is 3,79,891 tCO2e. Also, the total GHG emission removals generated (ex-post) in the first monitoring period (i.e., 01-March-2021 to 31-January-2024) are calculated as 429,924 tCO2e (Including buffer).

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation/ Verification	This section will be updated after the validation and verification process has concluded	VCS	KBS Certification Services Limited	Three years
First monitoring	01-March-2021- 31-January-2024	VCS	KBS Certification Services Limited	Two years and eleven months

1.3 Sectoral Scope and Project Type

Sectoral scope	14-Agriculture, Forestry and Other Land Use (AFOLU)
AFOLU project category[3]	Afforestation, Reforestation and Revegetation (ARR)
Project activity type	Revegetation

1.4 Project Eligibility

1.4.1 General eligibility

[3] See Appendix 1 of the VCS Standard

The project has met the eligibility criteria of ARR, under AFOLU project categories as mentioned in APPENDIX 1 of the VCS standard v4.7[4].

This project is seeking registration under the Verified Carbon Standard v4.7 as an ARR project and has been developed in compliance with the CDM Afforestation/Reforestation (A/R) methodology - "A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands" (AR-ACM0003 Version 02.0).

The general eligibility criteria of the project under the scope of the VCS Program as per section 2.1 of VCS project standard v4.7. The justification is mentioned below-

S. No.	General Eligibility Criteria	Justification/Description
1.	Projects shall meet all applicable rules and requirements set out under the VCS Program, including the VCS Standard v4.7. Projects shall be guided by the principles set out in Section 2.2.1.	The project has been carefully designed to conform to the criteria set by the VCS (Verified Carbon Standard), with due consideration given to the relevant rules and regulations applicable to the project activities.
2.	Provide information to demonstrate that the project meets requirements related to the pipeline listing deadline, the opening meeting with the Validation/Verification Body (VVB), and the validation deadline	The project listing initiative was undertaken within three years of the project start date, 01-March-2021. The evidence related to the pipeline listing process is shared with the VVB. Additionally, the Validation/Verification (including the date of the opening meeting) for this AFOLU-ARR project was done within five years of the project start date. Therefore, the project successfully meets all prerequisites concerning the pipeline listing deadline (as per Section 3.8.2 of the VCS Standard Version 4.7) and validation deadline (as per Section 3.8.3 of the VCS Standard Version 4.7).
3.	Demonstrate that the applied methodology is eligible under the VCS Program. Where applying a methodology with scale and/or	The project utilizes the AR-ACM0003 methodology approved by the VCS program. This project is categorized as a grouped

[4] https://verra.org/wp-content/uploads/2024/04/VCS-Standard-v4.7-FINAL-4.15.24.pdf

	capacity limits, demonstrate that the project is not a fragmented part of a larger project or activity that would otherwise exceed such limits. If applicable, demonstrate that no single cluster of project activity instances exceeds the capacity limit.	project. The project is structured so that none of the future instances exceed the prescribed size limits (i.e. 10,000 ha) in terms of scale and/or capacity, as per section 3.6.9 of the VCS Standard Version 4.7. This ensures the project aligns with the rules and criteria specified by the chosen methodology.
4.	Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced. (As per section 3.1.4 of VCS Standard v4.7)	The project is designed in such a way that the project and its activities will not lead to the violation of any applicable law as mentioned in section 1.15, regardless of whether or not the law is enforced.
5.	The seven Kyoto Protocol greenhouse gases	The primary source of emission removals in the project predominantly arises from revegetation efforts. The principal greenhouse gas involved in this removal is carbon dioxide (CO_2), which is one of the seven greenhouse gases specified in the VCS Standard version 4.7.
6.	Ozone-depleting substances (ODS)	The project activity does not involve ozone-depleting substances (ODS) as the AR-ACM0003 methodology V2.0, which is used for this project, specifically addresses activities related to Afforestation, Reforestation, and Revegetation (ARR) without any association with ODS.
7.	Project activities supported by a methodology approved under the VCS Program through the methodology development and review process.	The project aligns with this requirement, as its activities are supported by a methodology that has been developed and reviewed in accordance with the standards of the VCS Program. The methodology, AR-ACM0003 is active on the Verra Registry during the start of the project and pipeline listing process.
8.	Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra	The project employs methodology AR-ACM0003: "Afforestation and Reforestation of Lands (excluding wetlands) Version 2.0." This methodology has received approval under the

	website for exclusions).	Clean Development Mechanism (CDM) Program. As a result, the project aligns with the applicable scope for implementation.
9.	Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements.	The project activity is not located within a jurisdiction covered by a jurisdictional REDD+ program.

1.4.2 AFOLU project eligibility

S.no.	AFOLU project eligibility	Justification
1.	Eligible ARR activities are those that increase carbon sequestration and/or reduce GHG emissions by establishing, increasing, or restoring vegetative cover (forest or non-forest) through the planting, sowing, or human-assisted natural regeneration of woody vegetation.	The proposed project activity consists of planting commercial tree species i.e., Eucalyptus hybrid and *Pinus caribaea* . These plantations results in the sequestration of significant amounts of CO_2 over the project's lifetime and also helps in increasing the vegetative cover.
2.	Eligible ARR projects may include timber harvesting in their management plan.	The project includes harvesting and replanting commercial tree species as part of the Project Management Plan[5]. The sustainable selective harvesting of timber species will be done following the rotation age of the species[6]. The tree harvesting will be immediately followed by replanting activities.
3.	The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date, as set out in Section 3.19.28 of VCS Standard v4.7.	Adhering to the section 3.19.28 of the VCS Standard v4.7, the project activity i.e. revegetation comprising planting of Eucalyptus hybrid and Pinus caribaea saplings is not an activity that drain or degrade the hydrological

[5] VCS_4888_PMP

[6] VCS_4888_Plantation Management SOP

		functions of ecosystems. Moreover, no native ecosystems were converted for the implementation of the project activity within 10 years prior to the project start date. This is assessed via. thorough analysis of tree/vegetation cover existing in the project area in past 10 years of the project start date via. visual interpretation of Google earth pro historical satellite images (for all available years between 2011 and 2020), Hansen tree cover (%) assessment[7], and Land Use and Land Cover (LULC) assessment (between 2011 & 2020 i.e. 10 years before project start date)[8] to check if forest area (a native ecosystem) had been cleared and/or converted to other land use. Hence, on the basis of the above assessments it is concluded that there was no clearance of native ecosystems within 10-years prior to the project start date.

Identification of the eligible project area –

The pre-project scenario identified in the project is the lands (Under National Forest Authority) lying in a degraded state (refer to section 3.4 for more information) in the form of degraded scrublands (2891.9 ha or 87%) and croplands (432.12 ha or 13%). These lands had been procured by the project participants (i.e. landowners) by means of a lease agreement[9] (legally binding) with the Uganda land commission or National Forest Authority (NFA) encouraging that only the land use practices restricted to the establishment and management of commercial tree plantations are to be carried out on these lands with prohibition on planting of agriculture crops with trees (i.e. taungya) (i.e. an agriculture practice) by virtue of its terms and conditions.

The major extent of the land area under the project being classified as degraded scrublands qualify for an AFOLU project fulfilling the eligibility conditions justified in the above table. However, a detailed assessment is conducted to ensure accuracy in compliance with the VCS standard. This assessment involves GIS and remote sensing analysis, followed by validation of

[7] VCS_4888_Tree_Cover_Assessment_Report.pdf

[8] Refer to the VCS 4888_LULC analysis under section 3.4 for more details.

[9] VCS 4888_ Landowner project registration agreement

the GIS findings through the on-ground surveys. The GIS and remote sensing analysis examines land conditions over the past 10 years, providing insights into the factors contributing to its degraded state.

Following analysis was done through GIS and remote sensing –

a. Hansen Tree cover assessment[10]:[11] the Hansen tree cover assessment is carried out by first procuring the Hansen tree cover dataset (i.e. the raster layers) from Google earth engine and subsequently classifying the pixels in two categories on the basis of defined or default threshold value for minimum tree crown cover (in Uganda)[12] as 30%. These categories are:

    1. Pixels with ≥ 30% tree crown cover
    2. Pixels with ≤ 30% tree crown cover

    Post classification step, the raster layer was converted to vector layer and all the resulting pixels falling below ≤ 30% tree crown cover defined threshold were removed from the layer. In the next step, remaining pixels with ≥ 30% tree crown cover were overlaid on the project area KML and individually evaluated further via. Visual interpretation, meant for spotting presence or absence of tree cover or alike attributes (e.g. visible dense vegetation). In this step, it was observed that many of the pixels (category 1) were false-positive (i.e. showing areas not containing any tree cover). All the false positive pixels were identified and left under status quo whereas, each of the true-positive pixels were addressed for removal of the ineligible areas (e.g. dense tree cover). Ultimately, the tree cover assessment was concluded with removal of 1243 ha as ineligible area and 3324 ha as the remaining eligible area.

b. Land Use Land Cover (LULC): The analysis was done at three points of time, for 2011, 2013, 2016 and 2020 to see the land use and land cover change in the past 10 years and at the baseline year. In the year 2020, 81.45% of the land was classified as Degraded scrubland, 5.55% was classified as Degraded open land and 13% was classified as cropland. There was 0% forest land classified in the LULC analysis.

    (Note: The Degraded Open Land and Degraded Scrubland must be understood as degraded scrublands as the principal land cover class and not treated as separate land cover classes.)

YEAR	2013		2016		2020	
Class	Area (ha.)	Area (%)	Area (ha.)	Area (%)	Area (ha.)	Area (%)
Forest/Plantation	0.00	0.00	0.00	0.00	0.00	0.00
Degraded Open	160.38	3.50	159.30	3.48	184.48	5.55

[10] VCS 4888_Hansen Tree cover assessment report

[11] https://gfr.wri.org/data-methods

[12] A single minimum tree crown cover value between 10 and 30 per cent

c. Ground truthing through on-

land						
Built-up	0.00	0.00	0.00	0.00	0.00	0.00
Cropland	1,198.53	26.19	1,102.59	24.10	432.12	13
Degraded Scrubland	3,217.05	70.30	3,314.07	72.42	2707.41	81.45
Wetland/Swamps	0.00	0.00	0.00	0.00	0.00	0.00
Water bodies	0.00	0.00	0.00	0.00	0.00	0.00
Total	4,575.96	100	4,575.96	100	3324.02	100

site surveys: Although GIS and remote sensing analysis was conducted comprehensively across the entire project area to provide a precise assessment of land use and land cover, it cannot solely serve as the basis for eligibility determination due to certain limitations. Factors such as high variability in land characteristics across a large project area can influence results, while scattered project sites across different regions may lead to data inconsistencies. Additionally, Uganda's tropical location results in persistent cloud cover, affecting the availability of clear satellite imagery. Misclassification can also occur due to similar spectral signatures of different land cover types. Therefore, ground validation is carried out to enhance accuracy in identifying eligible land.

A ground survey was conducted to validate the findings of the GIS and remote sensing analysis, ensuring accuracy in land parcel selection. The survey primarily focused on areas classified as forest cover in the Hansen tree cover assessment. The results revealed that the classification was largely influenced by the presence of invasive weeds and shrubs along with a few scattered trees, rather than an actual forested landscape. As explained in section 3.4.

According to Section 3.19.29 of the VCS Standard 4.7, the project area qualifies for the ARR project as it has been classified as degraded scrublands and croplands based on NDFI, LULC, and Hansen tree cover analyses. Additionally, the National Forestry Authority (NFA) has identified the area as degraded land and subsequently leased it to landowners for restoration. The degradation of the area was not caused by project activities, as before the project start date, the land was under NFA ownership, and the lands were illegally under agricultural practices. Therefore, the planted area of 3324 hectares (after removing 1243 ha ineligible area under Hansen tree cover assessment; point (a) above) is eligible for the ARR activity.

1.4.3 Transfer project eligibility

The project activity is non-transferable[13] i.e. the project (with activities included within the scope of the VCS Program) is not registered under another GHG program and now seeking to register under the VCS Program. Therefore, there is no need to justify eligibility conditions in the context of this section.

1.5 Project Design

Indicate if the project has been designed as:

☐ Single location or installation

☐ Multiple locations or project activity instances (but not a grouped project)

☒ Grouped project

Grouped Project Design

The project is a grouped project, designed to include multiple locations or project activity instances over the project life. All future project activity instances will apply the same project activity (i.e. revegetation) as used in the first project instance. As per section 3.6.16 of VCS project standard v4.7, eligibility criteria for the new project activity instances are discussed below.

Eligibility Criteria	Justification/Description
Meet the applicability conditions set out in the methodology applied to the project.	The project meets the applicability conditions set out in AR ACM0003 "A/R Large scale Consolidated Methodology, Afforestation and reforestation of lands except wetland" v 2.0 and specified in the project description (Section 3.2)
Use the technologies or measures specified in the project description.	Applies the technologies or measures in the same manner as specified in the description of the Project Activity (Section 1.12) and indicated in the AR ACM0003 methodology.
Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	To assess the baseline scenario of new geographic areas under the new project activity instance a Hansen Tree cover assessment analysis will be done followed by LULC analysis and ground truthing. Areas that were degraded in the past due to forest

[13] See Appendix 2 of the VCS Standard v4.6

	encroachment and agricultural practices will be included in the project.
Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area.	The additionality of the new instances will be consistent with the initial instances for the specified project activity and geographic area. The activities to be implemented will not be common practice in the region.
Occur within one of the designated geographic areas specified in the project description.	The upcoming project activity instances will be situated within the defined project zone consisting of the Northern, Central, and Western regions of Uganda. Each of the upcoming project activity instances will fall within the project zone boundary and will also share commonalities in terms of geography and meteorological conditions.
Conform with at least one complete set of eligibility criteria for the inclusion of new project activity instances. Partial compliance with multiple sets of eligibility criteria is insufficient.	New project activity instances will meet the requirements outlined in a predefined set of criteria established for eligibility. The new instances will satisfy all the specified conditions and guidelines within that particular set of criteria to be considered eligible for inclusion in the grouped project.
Be included in the monitoring report with sufficient technical, financial, geographic, and other relevant information to demonstrate compliance with the applicable set of eligibility criteria and enable sampling by the VVB.	The applicable set of eligibility criteria is mentioned in section 6 of this PDMR, which will be applicable for all the new project activity instances.
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	The Project Proponent holds legal documents as evidence of ownership for each project activity instance, with the corresponding start date signifying when the project activity instance commenced its efforts to remove or eliminate greenhouse gas emissions. Please see section 1.8 for detailed understanding on the types of ownership included in

removing GHG emissions)	this project.
Have a start date that is the same as or later than the grouped project start date.	The start date will align with the grouped project start date wither as the same date or a date later than it. It will correspond to the date on which activities that lead to the generation of reductions or removals are implemented (e.g., **preparing land for seeding**, **planting**, or implementing management or protection plans etc.) i.e. similar to the project's first instance and thus, will be in-accordance with section 3.8 of the VCS standard v4.7
Only be eligible for crediting from the later of start date of the project activity instance or the start of the verification period in which they were added to the grouped project activity, through to the end of the total project crediting period.	Project instances that are subsequently added will be eligible for credits from their respective start date through the conclusion of the project crediting period.
Not be or have been enrolled in another VCS project.	The project activity is not concurrently participating in any other VCS project. This has been validated by verifying all the registered projects that are present within the project zone.
Adhere to the clustering and capacity limit requirements for multiple project activity instances set out in 3.6.9.	The project complies with the clustering and capacity limit requirements for multiple project activity instances as per sections 3.6.8 to 3.6.9. As per section 3.6.8 of VCS standards v4.7, the future project instances will be located within ten kilometers of each other within the defined project zones. These future instances will cover an area of 5,434 ha, thereby indicating that none of these instances will

	be exceeding the capacity limit of 10,000 ha and therefore complying with section 3.6.9 of VCS standards v4.7.

1.6 Project Proponent

Organization name	OYU Green Pvt. Ltd.
Contact person	Mr. Srajan Gupta
Title	VP – Project Origination
Address	Plot C1, Govindpura Industrial Area, Bhopal - 462016
Telephone	+91 97558 84444
Email	srajang@oyugreen.com

OYU Green Pvt. Ltd. is responsible for overall project development and implementation, establishing agreements with the landowners, conducting baseline surveys and local stakeholder consultations, and organizing training related to monitoring and risk mitigation with the Landowners, Plantation Managers, and workers.

1.7 Other Entities Involved in the Project

Organization name	Shri Maa Marketing Pvt. Ltd.
Role in the project	Account Operator
Contact person	Mr. Deep Gupta
Title	VP - Global Expansion

Address	India
Telephone	+91 98937 58888
Email	deep.gupta@shrimaagroup.in

Shri Maa Marketing Pvt. Ltd. is involved in handling the project account at Verra Registry.

1.8 Ownership

The landowners, who has participated into this program by signing a legal agreement with the OYU Green, holds the legal right over the land to execute plantation activities on the basis of different landownership types as defined under Chapter 227 of the Uganda Land Act[14].

Considering the diverse group of landowners participated into the program, there are three different types of landownership (legally defined under the Uganda Land act):

1) Freehold : As per the definition provided under Uganda Land Act, freehold tenure is a type of land ownership that allows a person to hold registered land indefinitely. The owner has full rights to use, develop, sell, lease, mortgage, or transfer the land, as well as to benefit from its produce, subject to legal regulations.

2) Leasehold : Leasehold tenure under the Uganda Land Act is a form of land ownership where a landlord (lessor) grants a tenant (lessee) exclusive possession of land for a defined period, as specified in a contract or by law. The lease may involve payment of rent, a premium, or other agreed terms, and both parties have specific rights and responsibilities, subject to the lease conditions.

3) Private mailo : Mailo tenure under the Uganda Land Act is a form of land ownership where land is held indefinitely and registered in the owner's name. It allows for the separation of land ownership from developments made by lawful or bona fide occupants. The owner has similar rights to those under freehold tenure but must respect the legal rights of occupants present at the time the tenure was established.

All the above categories defined is explicitly recognized as a legitimate form of land ownership as per the applicable landownership law in Uganda.

In this project, the distribution of the landownership types are as follows:

[14] https://mlhud.go.ug/wp-content/uploads/2019/03/Land-Act-Chapter_227.pdf

Table 1: Distribution of landownership type across the project area[15]

Type of landownership	% Distribution of Total area
Leased	87%
Freehold	3%
Private Mailo	10%

It can be seen from the above table that majority of the land area is under lease with the landowners. The landowners have taken the land on lease from the National Forest Authority of Uganda for the period of 99 years and 49 years under the National Forestry and Tree Planting Act of 2003[16].

The leased land grants landowners full authority and user rights, as per the legal agreement[17], to establish, manage, monitor, and harvest plantations. This confirms that the landowner has complete control over plantation activities and can fully benefit from the harvest.

For the small portion of land under freehold and private Mailo tenure, landowners have complete independence to carry out any activities that generate benefits, including selling the land, as defined under the Uganda Land Act. This grants them full rights to make independent decisions regarding plantation activities and retain ownership of the plantation.

The land ownership arrangements detailed above comply with the Verified Carbon Standard (VCS) guidelines outlined in Section 3.7.1 of the VCS Standard v4.7. Specifically, land parcels under freehold and Private Mailo tenure systems align with the provisions specified in point 2, while leased lands involving the National Forestry Authority (NFA) correspond to the stipulations

[15] VCS 4888_landownership database

[16] In Uganda, the **National Forestry and Tree Planting Act No. 8 of 2003** provides the legal framework allowing the government to grant licenses to private entities for the restoration of degraded lands. Specifically, Section 41 of this Act permits the responsible body, such as the National Forestry Authority (NFA), to issue licenses to individuals or organizations for sustainable utilization and management of degraded lands, which includes activities like tree planting and forest restoration. –

https://ugandatrades.go.ug/media/National_Forestry_and_Tree_Planting_Act_2003.pdf

[17] VCS 4888_Landownership documents

in point 4 of the aforementioned section. These alignments ensure that the project's land tenure and ownership structures meet the VCS requirements for carbon offset projects.

Carbon Ownership rights transfer through lease hold ownership

Landowners asserts its legal rights over carbon credits generated from the plantation and which was further transferred to the project proponent, OYU Green Pvt ltd through a legal agreement to complete the carbon financing process. The legal rights of landowners over the carbon rights was based on the following considerations:

1) The Lease Agreement Does Not Prohibit Carbon Credit Claims: Landowners has entered into a lease agreement with the National forest Authority (NFA, Uganda)[18], granting it rights to utilize the land for the plantation. The Uganda Land Act (Chapter 227) recognizes leasehold tenure as a legitimate form of land ownership, the agreement itself is providing lessees with exclusive rights to use the land for agreed purposes and can generate benefits out of it including the harvest. There is no provision within the Act or the specific lease agreement that restricts landowners from claiming carbon credits derived from its plantation activities.

2) Full Financial and Operational Control by the landowner: Landowner maintains full financial and operational control over the plantation. As the sole authorized owner and operator of the plantation activities, landowner is responsible for all aspects of project execution, including financial investment, operational management, and plantation harvest. This autonomy ensures that the landowner holds exclusive rights to all benefits arising from the project, including carbon credits.

3) No Competing Claims Over Carbon Ownership: There are no competing claims from other entities regarding the carbon benefits of the project. Landowners, as the legally recognized leaseholder and project implementer, possesses exclusive rights over the plantation's environmental and economic outputs, including carbon sequestration. The lease agreement secures landowner's authority over land use, ensuring that carbon ownership is undisputed and solely attributed to the Landowner.

The landowners with Freehold and Private mailo hold a legally authorised land title which gives independent ownership of the land and the benefits associated with it as per the Uganda land act.

Thus, based on the land ownership records and the landowners' investment in project activities, which contributed to increased carbon stock, followed by verification and carbon revenue

[18] Lease agreement Between the National Forest Authority (NFA) and the Landowner.

generation, it is evident that the landowners hold the carbon ownership associated with the plantation and have the right to transfer it to OYU Green[19]by virtue of the terms and conditions of the landowner project registration agreement between PP and the landowners. The legal agreements between 'PP & the landowners' and 'NFA & the landowners' along with their terms and conditions are commercially sensitive in nature and has been shared with the VVB for validation of the same.

1.9 Project Start Date

Project start date	01-March-2021
Justification	The field planting started in the project area on 01-March-2021, which was preceded by land preparation activities like sapling transportation, site preparation, pit digging on February, 2021. Hence, the project start date was considered as 01-March-2021 as per Section 3.8 of VCS standards version 4.7. The payment receipts of sapling transportation from nursery have been shared with VVB as the evidence for project start date.

1.10 Project Crediting Period

Crediting period	☐ *Seven years, twice renewable* ☐ *Ten years, fixed* ☒ *Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)* As per section 3.9.3 of VCS Standard v4.7, for all AFOLU projects other than such ALM projects described in 3.9.2 of the same documents, the initial project crediting period shall be a minimum of 20 years up to a maximum of 100 years. In this project, the first crediting period has been set at 20 years which will be renewed once making the total crediting period of 40 Years.
Start and end date of the first or fixed	01-March-2021 to 28-February-2041

[19] VCS 4888_Legal agreement and benefit sharing pdf

crediting period	

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

☐ < 300,000 tCO2e/year (project)

☒ ≥ 300,000 tCO2e/year (large project)

Calendar year of the crediting period	Estimated GHG emission reductions or removals (tCO_2e)
01-March-2021 to 31-December-2021	113,310.58
01-January-2022 to 31-December-2022	270,444.10
01-January-2023 to 31-December-2023	612,745.04
01-January-2024 to 31-December-2024	487,493.70
01-January-2025 to 31-December-2025	732,181.28
01-January-2026 to 31-December-2026	381,287.04
01-January-2027 to 31-December-2027	617,918.07
01-January-2028 to 31-December-2028	705,471.64
01-January-2029 to 31-December-2029	875,066.46
01-January-2030 to 31-December-2030	961,457.09
01-January-2031 to 31-December-2031	-1,466,186.50
01-January-2032 to 31-December-2032	-750,196.25
01-January-2033 to 31-December-2033	-152,605.85
01-January-2034 to 31-December-2034	306,205.10

01-January-2035 to 31-December-2035	631,267.56
01-January-2036 to 31-December-2036	400,263.48
01-January-2037 to 31-December-2037	546,442.02
01-January-2038 to 31-December-2038	628,332.82
01-January-2039 to 31-December-2039	739,898.42
01-January-2040 to 31-December-2040	818,661.17
01-January-2041 to 28-February-2041	138,380.43
Total estimated ERRs during the first or fixed crediting period	7,597,833
Total number of years	**20**
Average annual ERRs	**3,79,891**

1.12 Description of the Project Activity

Background:

Uganda spans an area of 241,555 square kilometers, with 45,318 square kilometers consisting of open water and wetlands, and the remaining 196,237 square kilometers being land. The altitude within the country varies from 620 meters at the Albert Nile to a peak of 5,111 meters at Mt. Rwenzori. Arable land comprises 27.4%, and 11.2% is in permanent crops; only 0.1% of cropland is irrigated (World Bank 2009a)[20].

Uganda is experiencing a swift decline in its biodiversity, estimated at 10% per decade, and a consistent loss of fixed carbon across most regions. These losses can be mitigated by optimizing the country's natural resources, particularly through tree plantations that offer solutions to combat climate change.

The project activity comprises the revegetation of overall 10,000 ha (3324 hectare is achieved in the first instance) of degraded scrubland (87%) and croplands (13%) across the Northern,

[20] https://www.land-links.org/country-profile/uganda/

Central, and Western regions of Uganda with timber-producing tree species i.e. Eucalyptus hybrid and *Pinus caribaea*. The project activities aim to benefit landowners, the local community, and biodiversity during the project's lifetime and beyond.

The project activity is not located within the jurisdiction covered by a jurisdictional REDD+ program.

Role of entities involved in various Project Activities:

1. Landowners- Landowners bear a comprehensive array of responsibilities throughout the lifecycle of a tree plantation, starting from initial site preparation to ongoing maintenance and eventual harvesting. These duties entail attention to detail and consistent monitoring to ensure the health and vitality of the plantation, including site preparation, spacing measurement, soil pitting, planting of saplings, regular monitoring, and maintenance.

2. OYU Green Pvt Ltd. – OYU Green is involved in the overall project development following Verra guidelines. It consists of several teams that are involved in conducting capacity-building sessions, training on different project aspects, project documentation, data monitoring, field measurements, and quality checks. The team involved in data monitoring is responsible for designing the monitoring plan, instruction manuals, and Standard Operating Procedures for the field coordinators while the field coordinators are responsible for executing the plan and taking the measurements such that data quality is assured and recorded properly in the Plantation Inventory Database. As the project developer of carbon projects, their comprehensive support ensured the successful implementation of activities on the ground and the development of this project.

3. Shri Maa Marketing Pvt. Ltd.- The entity is only involved in handling the Verra Registry account for this project.

4. Local communities- They play a key role in this project being the major stakeholder in decision-making during the local stakeholder consultations and giving their valuable inputs. It is the local community that is employed in the execution of various project activities; thus, they are involved in important project activities like site preparation, plantation establishment, plantation maintenance, and regular monitoring.

Description of Project Activities:

1.) **Trainings and workshops:**

The Project Proponent conducted training and workshops on- land preparation, planting activities, post-planting management (including silviculture operations), risk identification and its mitigation (such as forest fire prevention), and plantation monitoring, focused on

field measurements of parameters (i.e. Diameter at Breast Height) essential for Carbon Stock Assessment.

Picture 1: Training on land preparation for plantation activity

Picture : Preparation of fire breaks for prevention from forest fires

Picture 2: Training provided on Measurement of tree parameters (on left) and sample plots demarcation (on right)

These trainings were conducted in-person and through virtual training by the OYU Green Team. Here, landowners and their plantation managers (recruited from the local community) are given specific training related to this project to maintain uniformity regarding various project activities throughout the project's lifetime[21].

The training aims to enhance skills among the entities involved in the project to enhance their knowledge regarding Sustainable Forest Management[22] practices, which involve ecologically appropriate measures such as Integrated Pest Management, use of biological fertilizers (such as Farm Yard Manure), manual weeding, and sustainable harvesting. The practices ensure that ecological resilience is maintained within the project area such that a revegetated ecosystem is established and maintained beyond the project's lifetime. This will eventually lead to biodiversity enhancement and amelioration of the microclimate in the project area. Another major impact would be on the local community by mitigating climate change impacts and enhancing their adaptation capacity to the climate change impacts.

The training was provided at the onset of each project activity so that immediate and effective implementation of each activity could take place. The training records are shared with the VVB.

2.) Sourcing of saplings and Site Preparation:

The saplings raised in locally available certified nurseries are purchased by the landowners, which is a Quality Planting Material (QPM) usually raised with the help of clonal propagation

[21] VCS 4888 Training and Capacity Building Report

[22] Sustainable forest management | UNFCCC

technology[23]. So, the saplings are usually the clones having superior genotypic and phenotypic qualities such that they can resist disease, insects, and pest attacks. The trees tend to have fewer deformities such that they yield high-quality timber which can give good returns on harvest. These clones can resist climate extremes such as changing weather patterns that may lead to water and heat stress. The clones also have a unique feature of reduced branching, such that the neighbouring trees face less competition and the requirement for regular pruning is also reduced.

Picture 3: Saplings in local nursery

The site preparation takes place within the project area before transplanting nursery-raised saplings to the field. So, the landowners and their respective Plantation Managers[24] are

[23] Chapter 16 Clonal propagation - ScienceDirect

[24] Plantation Managers are the locally recruited people, who are involved in the management of plantation areas by the landowners.

trained by the OYU Green field coordinators such that minimal disturbance occurs in the soil by following measures mentioned below-

The baseline trees identified during the initial survey were demarcated to protect them from cutting or felling during site preparation, as well as to facilitate future monitoring. A total of 2029 trees were identified of different species across 3324 hectares.

Additionally, It is ensured that the pre-existing vegetation consisting of invasive shrubs is removed manually with the help of Machete (locally known as Panga), such that uprooting is avoided that may lead to significant soil disturbance. The vegetation thus slashed down is allowed to be decomposed within the project area ensuring no biomass burning takes place.

Picture 4: Workers using panga to remove invasive shrub

Once the vegetation is decomposed, soil pits are created with the help of the line planting method to ensure uniform spacing between the trees. The location of the pits is marked with a uniform distance of 3 meters by 3 meters such that a high stocking plantation is created for the production of high-quality commercial timber.

The pits are created before the onset of the first rainy season (i.e. from March to May) with a dimension of 25 cm length and 25 cm width such that less than 5 percent soil disturbance is ensured within the project area as explained in SOP[25] . It is ensured that the plantation site has an adequate drainage facility such that excess water can flow without causing any disturbance to the soil in the form of soil erosion.

Landowners are suggested to use Farm Yard Manure (FYM), compost, and green manure which supplements the required soil nutrients while enhancing soil moisture conservation efforts.

[25] VCS 4888 Plantation Establishment SOP

3.) **Planting Operation:**

The nursery-raised healthy saplings are transplanted to the designated project sites following the process of 'Hardening off', to acclimatize saplings from external risks and ensure a high survival rate.

The saplings are removed from polybags and are immediately transferred to the selected pit, which is followed by the filling of pits with soil that was removed during the site preparation as per SOP[26]. It is ensured that saplings are well covered up to the root collar with loose soil, such that a healthy root system can be established.

Picture 5: Planting of saplings of Eucalyptus hybrid

The Planting Operation is a crucial phase where saplings are prone to several risks, therefore regular monitoring is required by the plantation managers and workers.

4.) **Plantation maintenance:**

The phase where the sapling grows into a mature tree requires several silvicultural operations (also known as tending operations) to establish a healthy stand with uniform conditions- such as even-aged, monoculture species having similar Diameter or Height class.

[26] VCS 4888 Plantation Establishment SOP

The silviculture operations include Brushing or Pruning of twigs & branches and thinning of trees after regular intervals to minimize competition for other neighbouring tree species, which also reduces the probability of potential risks.

Regular visits to the plantation site would also help to check on insects, pests, and disease infestation. Any possible risk can be mitigated immediately based on the Risk Mitigation plans as per SOP[27].

The intensity and frequency of maintenance required could depend upon several factors such as the age of saplings, weather patterns, soil conditions, risks to the project site, etc. So, the manpower, equipment, and financial investments would fluctuate throughout the project's lifetime.

5.) Inventory or monitoring of plantation:

A crucial step involved in the carbon stock calculation of the project area, where landowners and Plantation Managers are provided training by the OYU Green Team to identify and mark the sample plots for taking tree measurements such as Diameter at Breast height (DBH) following the SOP[28].

The landowners and their Plantation Managers are explained in detail about the requirements of high-accuracy data and its use for GHG accounting. So, the Permanent Sample Plots created during the project activity are given special attention for monitoring tree growth at regular intervals.

The monitoring of sample plots or project sites is followed by regular quality checks by the OYU Green team where random plots are visited and re-measured to check the accuracy of data recorded by the workers, plantation managers, or landowners.

[27] VCS 4888 Risk Mitigation SOP

[28] VCS 4888 Project Monitoring SOP

Picture 6: Measurement of tree parameters

1.13 Project Location

The first project activity instance is located within the Northern, Central, and Western regions of Uganda. These three region boundaries together create a project zone where present and future project activity instances have been planned to be executed.

The individual land parcels belonging to different landowners are called discrete project areas or discrete land parcels that have distinct boundaries. The combination of multiple such homogeneous discrete land parcels together comprises a stratum having even-aged trees of a single species that results in a monoculture block.

The location and boundaries of the entire planted area during the first project activity instance are provided separately to the auditors in the form of KML files.

The geo-coordinates for each region falling within the project zone are mentioned below-

The geo-coordinates for the Northern Uganda region are:

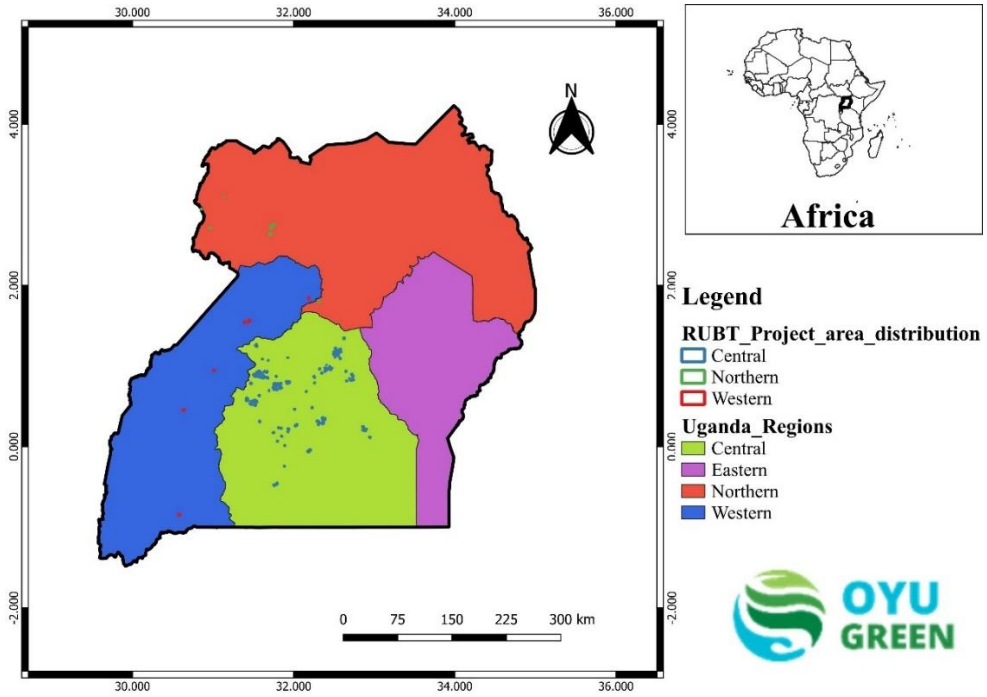
- Latitude: 2.7939469426130743
- Longitude: 32.610901420282325

The geo-coordinates for the Central Uganda region are:

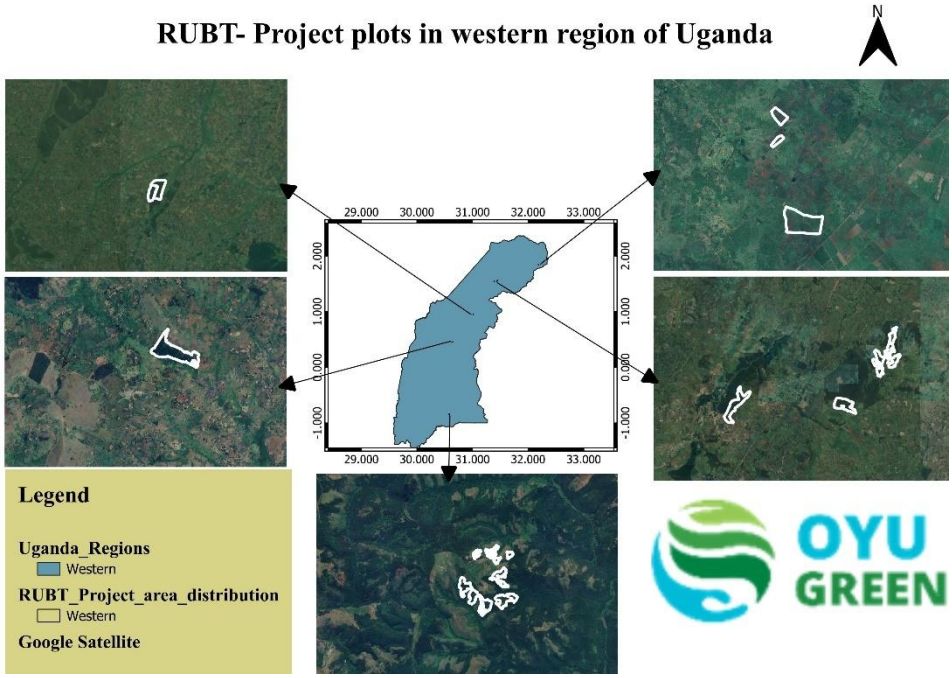
- Latitude: 0.6159974116525878
- Longitude: 32.090999042149996

The geo-coordinates for the Western Uganda region are:

- Latitude: 0.377046857099184
- Longitude: 30.56722613766169



a)



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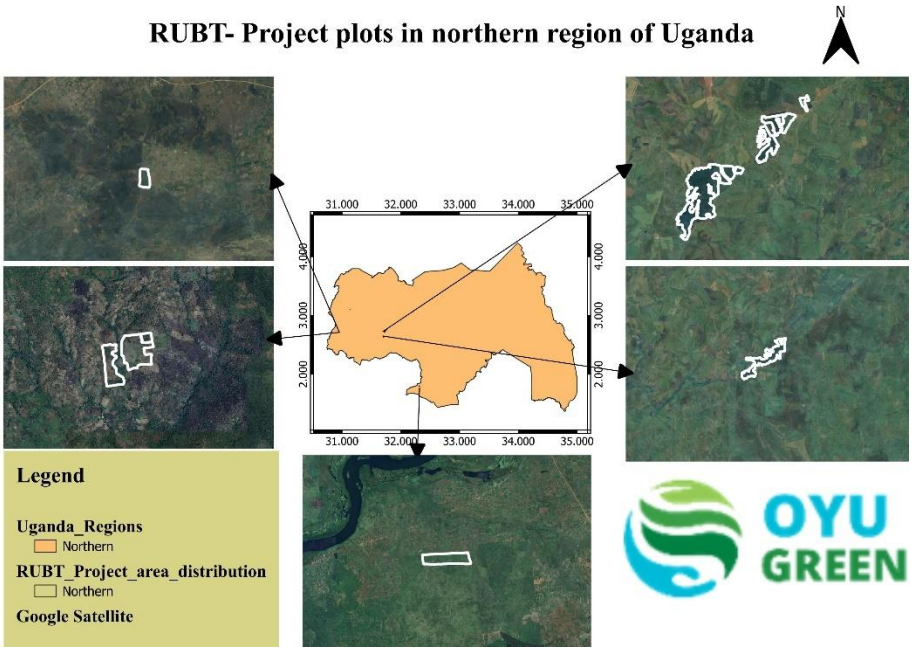

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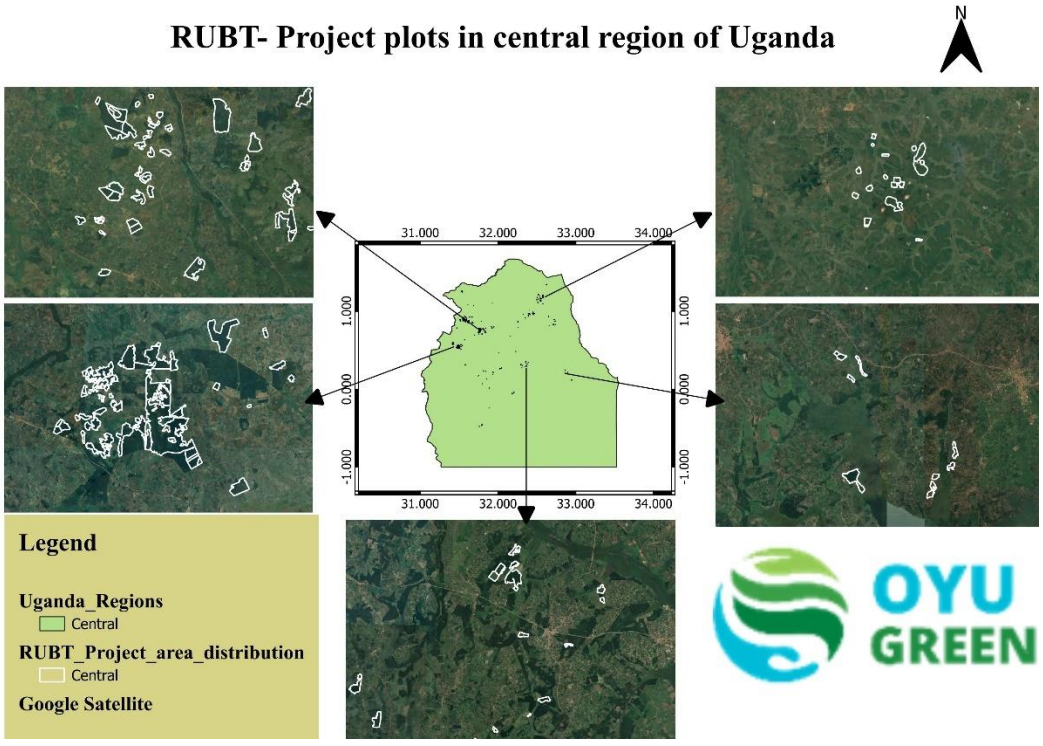


d)

Picture 7: a/b/c/d Demarcation of Project area in different regions (Project zones).

1.14 Conditions Prior to Project Initiation

The project activity includes the Revegetation of land with commercial tree species that does not lead to the generation of GHG emissions for the purpose of their subsequent removal, or destruction. Instead, it results in significant sequestration or removal of ambient carbon dioxide (CO_2) during the project's lifetime and beyond.

A general description of the conditions prior to the project initiation of the Uganda as a country comprising Northern, Central and Western regions is mentioned below:

Physical parameters of targeted project zone: Uganda

1. Ecosystem type:

Uganda's forests span 4.9 million hectares, making up 24% of the country's land. Protected areas cover 30% of forested land, including Central Forest Reserves, National Parks, and Wildlife Reserves.

2. Current and historical land use :

Land cover change as a proportion of land area has been significant in Uganda (5.29% ± 1.54)[29]. Land cover conversion in Uganda was greatly accelerated after 2000, after which there was a notable increase in unused/barren[30] lands and reduction in Open and Wooded Grasslands[31]. About 42% of the available land in Uganda is arable however, only 21% is utilized[32].

2.1

Present and prior environmental conditions of Uganda:

Vegetation-

The largest part of Uganda is covered by savannah vegetation, including grasslands. This type of vegetation is common in the northern and eastern regions of the country[33].

Topography-

The project zone exhibits a predominantly undulated topography, with a substantial portion comprising a plateau ranging from 800 to 2,000 meters (2,600 to 6,600 feet). The plateau

[29] https://www.fs.usda.gov/rm/pubs_journals/2021/rmrs_2021_bullock_e001.pdf

[30] https://www.sciencedirect.com/science/article/abs/pii/S0140196314000226

[31] https://www.mdpi.com/2073-4441/11/5/1042

[32] file (igad.int)

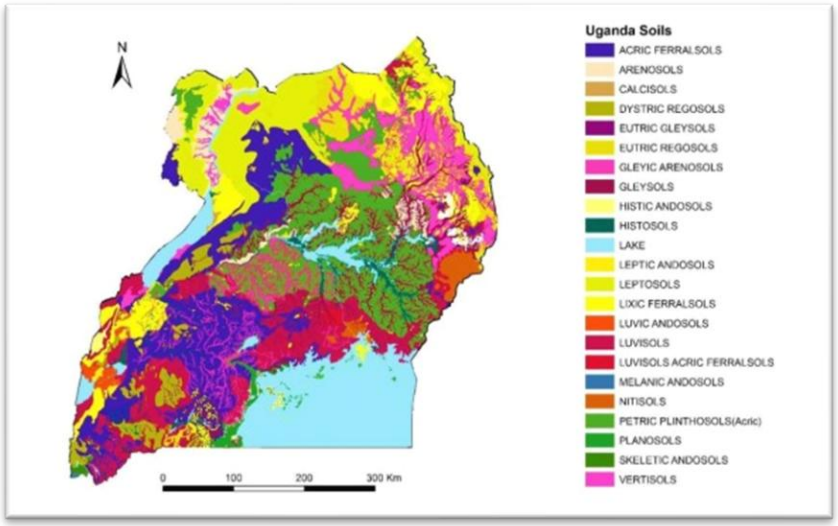
[33] https://www.planetafrica.co.za/v2/portal-africa/uganda-2/#:~:text=Ecologically%20speaking%2C%20Uganda%20is%20the,the%20north%20and%20northeast%20areas.

extends gradually from the shores of Lake Victoria to the western expanse of the Rwenzori Mountains. Characterized by a diverse landscape, the plateau encompasses hills, valleys, and low-lying areas.[34]

Soil Structure-

Uganda's soils were once considered among the most fertile in the tropics. Most of the soils in Uganda consist of Oxisols and Ultisols that are in their final 10 stages of weathering and as a result have very low nutrient reserves (Eswaran, et al. 1997; Stocking, 2003). The predominant minerals in these soils are quartz and Kaolinite. Oxisols and Ultisols tend to be acidic, with low fertility and CEC. Nutrients such as phosphorous, which occur predominantly in inorganic forms, are not readily available to crops because they are tightly bound to the surfaces of the iron oxide minerals and gibbsite, and to the edges of aluminosilicates such as kaolinite[35].

Uganda's soils vary by region, with nutrient-rich soil supporting diverse crops. Soil degradation is a growing concern due to unsustainable practices, deforestation, and climate change. Fertile soils are in the central and western regions, while the drier northern and eastern regions have less fertile soils.



Picture 8: Major soil regions of Uganda

[34] https://en.wikipedia.org/wiki/Geography_of_Uganda#:~:text=The%20terrain%20of%20Uganda%20mostly,in%20the%20geography%20of%20Uganda

[35] https://dr.lib.iastate.edu/server/api/core/bitstreams/82f453d1-6f6e-4e13-87ee-6913604c35f3/content

Climatic Conditions:

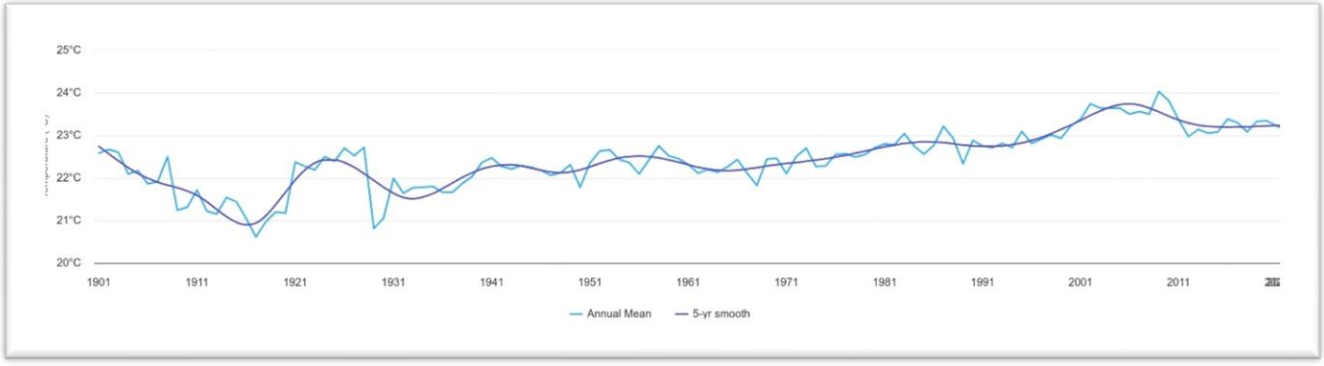
1. Rainfall Pattern-

In Uganda, landowners primarily rely on rainfall for their irrigation needs. The country's land use is intricately tied to precipitation, with factors such as elevation and local geography shaping this dependency. Uganda witnesses both bimodal and unimodal rainfall patterns, experiencing variable rainfall ranging from 1000 to 1500 mm annually. The distribution of rainfall is generally uniform, except for the northeastern corner.

Uganda's climate is largely tropical with two rainy seasons per year, March to May and September to December. The northern region, which forms one-quarter of the country lies outside the tropical belt and hence experiences only one rainy season, March to October. The rest of Uganda lies within a relatively humid equatorial climate zone, and the topography, prevailing winds, lakes, and rivers cause large differences in rainfall patterns across the country. Uganda also experiences the El Nino Southern Oscillation (ENSO) phenomena, which are principal driving forces of intra-annual to inter-annual rainfall variability[36].

2. Temperature-

Uganda experiences moderate temperatures throughout the year, around 22.8°C, with monthly temperatures ranging between 21.7°C (July) and 23.9°C (February). During this period, the total annual average precipitation is 1,197 mm, and the mean monthly precipitation of the country varies from 39.6 mm in January to 152.7 mm in April[37].



Picture 9: Observed annual mean surface air temperature of Uganda for 1901-2022[38]

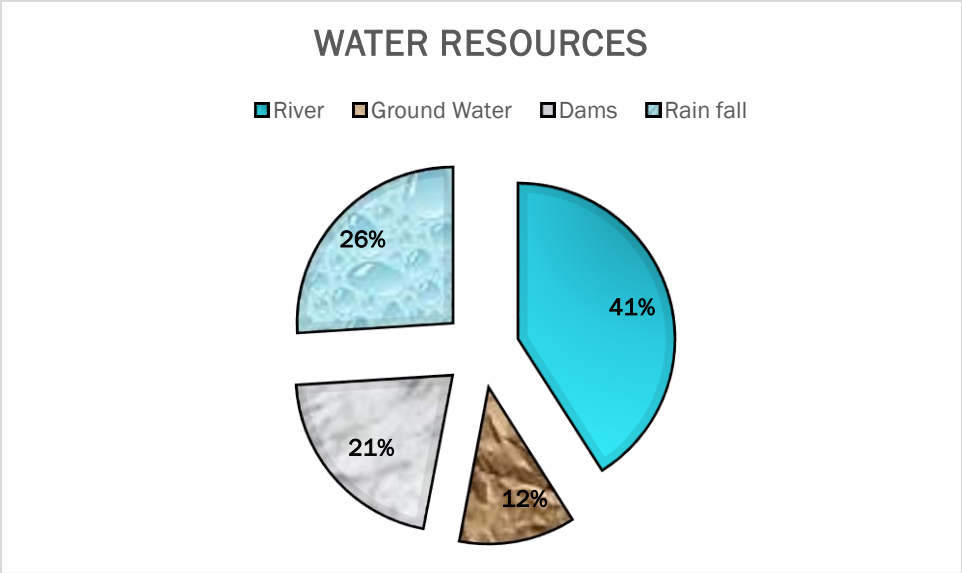
[36] https://climateknowledgeportal.worldbank.org/country/uganda/climate-data-historical

[37] https://climateknowledgeportal.worldbank.org/country/uganda/climate-data-historical#:~:text=Uganda's%20climate%20is%20largely%20tropical,rainy%20season%2C%20March%20to%20October.

[38] https://climateknowledgeportal.worldbank.org/country/uganda/climate-data-historical

Hydrology:

Uganda is a landlocked country that occupies 241,550.7 km^2 of land. Open water and swamps constitute 41,743.2 km^2 of area[39]. As per the baseline survey, the water sources for irrigation in the project area included natural stream water, rainfall, and groundwater sources like borewells and nearby dams. These resources were utilized to support plantation activities, ensuring a diversified and sustainable water supply for irrigation within the project area.



Picture 10: Pie chart depicting the abundance of the water resources

The Department of Water Resources Management of Uganda has categorized the surface water resources into eight main drainage sub-basins. These include; Lake Victoria, Lake Kyoga, River Kafu, Lake Edward, Lake Albert, River Aswa, Albert Nile, and Kidepo Valley. The yield from these sub-basins, though small compared with the total Nile flow, dominates the water resources potential within Uganda. Major water bodies include lakes Victoria, Kyoga, Albert, George, Edward, and another 149 smaller lakes spread across the country covering an area of 38,500 km^2.[40]

[39] UN-WWAP (2006) Uganda National Water Development Report; Prepared for the 2nd UN World Water Development Report "Water a Shared Responsibility" UN-WATER, WWAP/2006/9. World Water Assessment Programme (WWAP).

[40] WRMD (2004) The Year-Book of Water Resources Management Department (WRMD) 2002-2003. Entebbe

Table 2 The major shared water bodies and river courses of Uganda[41]

Water resource	Countries sharing	Basin wide
River Nile	Uganda, South Sudan, Sudan, Egypt	Burundi, DRC, Egypt, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania, Uganda, Eritrea
River Achwa	Uganda, South Sudan	Uganda, South Sudan
River Kagera	Tanzania, Burundi Rwanda, Uganda	Nile Basin Riparian States-Burundi, Tanzania, Rwanda, Uganda
River Semliki	DRC, Uganda	Nile Basin Riparian States
River Malaba	Kenya, Uganda	Kenya, Uganda
River Sio	Kenya, Uganda	Kenya, Uganda
Lake Victoria	Uganda, Kenya, Tanzania	Nile Basin Riparian States
Lake Albert	DRC, Uganda	Nile Basin Riparian States
Lake Edward	DRC, Uganda	DRC, Uganda
Sango Bay Swamp	Tanzania, Uganda.	Kenya, Burundi, Rwanda

The most prominent hydrological feature in Uganda is Lake Victoria, which is the second-largest freshwater lake in the world[42], with an area of 69,000 km^2. River Nile, which is the only outflow from the lake, has its source at the point where Lake Victoria spills over Ripon Falls. The 130 km stretch of the Nile from Lake Victoria to Lake Kyoga is termed the Victoria Nile.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

Uganda was one of the first countries to sign and ratify the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and has continued commitment to the UNFCCC, the Kyoto Protocol, and to the Paris Agreement. The Project activity complies with this regulatory framework, given that, 'Revegetation' is one of the mechanisms by which GHG emissions are expected to be removed in the AFOLU scope.

Uganda has updated its Nationally Determined Contributions (NDCs) recently in 2022, The implementation of the updated NDC mitigation policies and measures will be across energy, agriculture, forestry, and other land use (AFOLU), peatland, waste, and industrial processes and product use (IPPU). Unlike the first NDC of 2016, the updated NDC defines sectoral mitigation and adaptation measures and interventions with clearly defined corresponding indicators and targets for 2025 and 2030.[43]

[41] https://www.scirp.org/html/6-9402011_50896.htm

[42] Anyah, R.O. and Semazzi, F.H.M. (2004) Simulation of the Sensitivity of Lake Victoria Basin Climate to Lake Surface Temperatures. Theoretical and Applied Climatology, 79, 55-69. http://dx.doi.org/10.1007/s00704-004-0057-4

[43] Uganda's Updated NDC | UNFCCC

Table 3 Mandatory applicable Acts/laws and policies in the host country (Uganda)

Applicable Act / Policy	Main Focus / Supportive role	Compliance
National Forestry and Tree Planting Act, No. 8, 2003[44]	The act aims to sustainably increase economic social and environmental benefits from forests and trees by all people of Uganda. It promotes improvement and livelihoods through strategies and actions that contribute to poverty eradication and also encourages public participation in the management and conservation of forests and trees.	The National Forestry and Tree Planting Act does not limit the project's goals. The project activity generates economic benefits through plantation of commercial tree species and promotes social welfare through public participation of local stakeholders in tree planting for sustainable income and social impact. It also contributes to environmental well-being by removing greenhouse gas emissions. Under Sections 21(2) and 22(2) of the Act, all forest produce in a private forest belongs to the owner of the forest and may be used in any manner that the owner may determine. It is further emphasized that under Section 27(1) of the National Forestry and Tree Planting Act (2003), the Government or a local government has no ownership right over trees or forest produce situated on private land.
Land Act, Cap 227[45]	An Act to provide for the tenure, ownership, and management of land; to amend and consolidate the law relating to tenure, ownership, and management of land; and to provide for other related or incidental matters.	The plantations within the project area have been established on private lands. The landownership is verified by the Project Proponent to ensure that only the private lands are involved in this project activity. As a result, the project activity

[44] https://ugandatrades.go.ug/media/National_Forestry_and_Tree_Planting_Act_2003.pdf

[45] https://mlhud.go.ug/wp-content/uploads/2019/03/Land-Act-Chapter_227.pdf

		remains compliant with this specific legal requirement.
National Environment Act, 1995, Cap 153[46]	An Act to provide for sustainable management of the environment; to establish an authority as coordinating, monitoring, and supervisory body for that purpose; and for other matters incidental to or connected with the foregoing.	The project activity contributes to sustainable environmental management by lowering GHG emissions and actively mitigating the impacts of climate change. Consequently, this project activity goes beyond mere compliance with the law.
Land Acquisition Act 1965, Cap 226[47]	An Act to make provision for the compulsory acquisition of land for public purposes and for matters incidental thereto and connected.	Since the land used in project activity is owned by private landowners hence the restrictions under this Act do not prohibit the activities under these scenarios.
Uganda Wildlife Act, 1996 Cap 2000[48]	An Act to provide for sustainable management of wildlife; to consolidate the law relating to wildlife management; to establish a coordinating, monitoring, and supervisory body for that purpose and for other matters incidental to or connected with the foregoing.	The project activity involves the plantation of naturalized tree species on degraded scrubland and cropland, with no adverse impact on wildlife management, wild animals, or local biodiversity. Consequently, this act does not impose any constraints on the project activity.
The Constitution of the Republic of Uganda of 1995[49]	The legislation empowers Parliament to create laws for environmental protection and management. It lacks language specifically impacting the project activity.	The project activity adheres to the Constitution of the Republic of Uganda and complies with environmental protection measures.

Source: Information compiled from openly available publications of respective Acts and Policies

[46] https://nema.go.ug/sites/all/themes/nema/docs/national_environment_act.pdf

[47] https://mlhud.go.ug/wp-content/uploads/2019/06/Land-Acqusiton-Act-Chapter_226.pdf

[48] https://www.ecolex.org/details/legislation/uganda-wildlife-act-1996-cap-2000-lex-faoc009000/

[49] https://washington.mofa.go.ug/uganda/constitution-republic-uganda-1995#:~:text=replaced%20in%201967.-,The%201995%20Constitution%20established%20Uganda%20as%20a%20republic%20with%20an,In%202005%20and%20in%202017

The Project Proponent strictly adheres to all the relevant laws and regulations related to Worker's rights on national level as listed below:

1. The Employment Act, 2006[50]

2. National Social Security Fund Act, Cap 222[51]

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

1.17.2 No Double Claiming with Other Forms of Environmental Credit

[50] https://ulii.org/akn/ug/act/2006/6/eng%402006-06-08

[51] https://ulii.org/akn/ug/act/2022/1/eng@2022-01-07

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

The general eligibility criteria of the project under the Supply Chain (scope 3) emissions of the VCS Program as per section 3.24 of VCS project standard v4.7 –

S. No.	General Eligibility Criteria	Justification/Description
1.	Where the Project Proponent(s) or authorized representative is a buyer or seller of a product (i.e., a good or service) that is in a supply chain and whose product emissions footprint is changed by the project activities specified in the project description, the Project Proponent(s) or authorized representative shall make a statement on their website stating; "Carbon credits may be issued through Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [Project Proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]." The public statement shall be issued by the validation date	Adhering to the guidelines of the recommended program rule(s) i.e. VCS standard v4.7, section 3.24, puts obligation on the project proponent (PP) (or authorised representative) if he is a buyer or seller of a product (i.e., a good or service) that is in a supply chain, which is not the case in the project. The landowners have full rights over their lands and products (e.g. timber) thereof excluding the carbon rights as per the terms of the agreement between the project proponent and the landowners. The PP is of the view that while timber may enter a supply chain post-harvest activity; this supply chain would be purely landowner-driven and entirely independent of the project proponent's involvement and/or control. Therefore, does not put obligation on the PP or his organization to report scope 3 emissions.

1.18 Sustainable Development Contributions

1.18.1 Sustainable Development Contributions Activity Description

The first project activity instance focuses on the revegetation of degraded scrublands and croplands within the project zone by planting commercial tree species. This initiative aims to enhance environmental sustainability, strengthen community resilience against climate change, and enhance economic development for local communities in the project area.

This project activity aims to boost the socio-economic well-being of stakeholders through plantation activities, promoting economic growth. Additionally, it seeks to enhance soil health, nutrient availability, and increase green cover, contributing significantly to multiple Sustainable Development Goals as mentioned below:

- Decent work and economic growth (Goal 8): At its core, the project endeavors to combat poverty by creating sustainable livelihoods, providing employment opportunities to the local community, and engaging them in planting and plantation management activities. Special preferences are secured for local community members and those residing in the project's adjacent area. By providing employment, the project not only alleviates financial hardship but also empowers individuals to improve their quality of life and contribute to the overall economic prosperity of the region.
- Zero Hunger (Goal 2): To address food insecurity, the majority of the landowners are providing basic food amenities to all the workers and laborers who are involved in various project activities. This initiative ensures that everyone involved has access to essential nutrition, significantly reducing the levels of moderate or severe food insecurity. By prioritizing the well-being of both workers and the surrounding community, this project activity supports health and productivity, contributing to a more resilient and sustainable environment.
- Life on land (Goal 15) and Climate action (Goal 13): The project activities contribute to the Revegetation of degraded scrublands and croplands to increase tree cover and protect natural vegetation in the surrounding regions. The planted area acts as a buffer that helps in reducing the existing pressure from natural forests, thus providing additional ecosystem services to the local community. This effort is crucial for local biodiversity conservation and carbon sequestration enhancement. It also prevents natural hazards such as soil erosion and floods, protects catchment areas, improves water quality, and creates microclimates that support local ecosystems.

  During the first monitoring period, it was observed that some wild animals had taken shelter within the project area boundary. Landowners have observed the presence of Ant eaters, Monkeys, Snakes (such as Pythons), and several bird species such as hornbills and

Black-headed weaver (Ploceus melanocephalus) within their project sites. This shows an increase in wildlife population due to the establishment of plantation areas, thus the project is benefiting the local biodiversity.

Picture 11: Black-headed weaver (Ploceus melanocephalus) and their nests intricately woven on a tree has spotted near the plantation area

Picture 12: Green bush ratsnake (Gonyosoma prasinum) spotted inside the plantation site

1.18.2 Sustainable Development Contributions Activity Monitoring

The Project activity will contribute to the following indicators for sustainable development-

• **Socio-economic well-being:** Income, education, and occupation are the top three consistent measures used for measuring the status of socio-economic well-being. The project activity aims to benefit the primary stakeholders (i.e. landowners, plantation managers, and workers) by generating sources of income through the activities involved in the project and by creating employment opportunities. Furthermore, landowners are providing vacant lands available with them to the workers for agricultural activities, and accommodation. The landowners also provide workers with food and basic medical facilities in case of emergency.

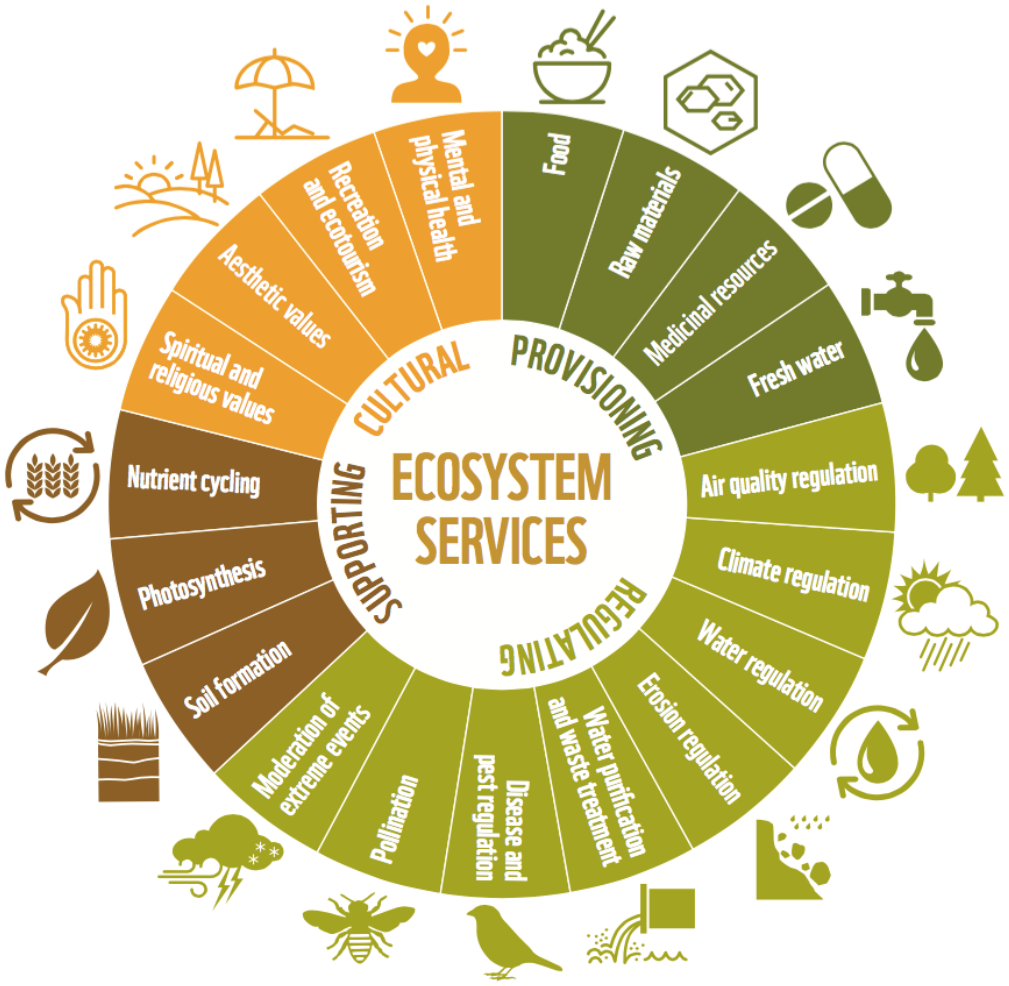
• **Technological well-being:** The project activities served to elevate the technological skills of primary and secondary stakeholders. Additionally, comprehensive training sessions were conducted to equip them with the proficiency to carry out baseline surveys, plantation monitoring, and other such planned activities effectively. The major emphasis of these activities was to make the local community adapt to the climate change impacts.

It is the local communities residing in the remote areas of Uganda that are most vulnerable to the climate change impacts[52] and thus they require additional support in terms of livelihood improvement and access to basic amenities, thus carbon projects can help reduce that gap. So, this project has the potential for adaptation, mitigation, and transformation efforts that are necessary to make the local community more resilient.

[52] Uganda prioritises adaptation to climate change with launch of the Local Climate Adaptive Living (LoCAL) Facility - UN Capital Development Fund (UNCDF)

Picture 13: Workshops and training given to the stakeholders

• **Environmental well-being:** The project activity involves establishing green cover within the project area to provide various ecosystem services to the local community and biodiversity, such as regulatory services, provisioning services, aesthetic services, cultural services, and recreational services. The detailed benefits from each of the mentioned services are highlighted with the help of figure below- URBAN ECOSYSTEM TEACHING | MATHIAS LEHNER



Picture 14: Ecosystem services[53]

Furthermore, the success of the Revegetation efforts has created a snowball effect[54] due to which communities residing at the boundary of the first project activity instance have also adopted similar practices, leading to increased plantation activities in the surrounding areas.

This has created a broader environmental and socio-economic upliftment, promoting sustainable development and biodiversity conservation in the region.

[53] URBAN ECOSYSTEM TEACHING | MATHIAS LEHNER

[54] Snowball Effect in Psychology (simplypsychology.org)

Table 4: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project's lifetime
1)	8.5	8.5.2 Unemployment rate, by sex, age and persons with disabilities	Implemented activities to decrease	The project has contributed to employment generation by creating a source of income for the local communities, currently employing 294 members, encompassing both men and women in the first monitoring period[55].	The project activity will generate employment opportunities for approximately 500 members in plantation activities, project implementation, and monitoring activities.
2)	13.2	13.2.2 Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	Raised plantations on 3324 hectares of land have resulted in 429,924 tCO2e emission removal during the first monitoring period.	The project activity is expected to achieve an emission removal of 7,597,833 tCO_2e (including buffer) over the 20-year crediting period.
3)	15.1	15.1.1 Forest area as a proportion of total land area	Implemented activities to increase	The project activity has increased the green cover[56], by Revegetation of 3324 hectares of the land area during the first monitoring period.	The project activity instance aims to increase the green cover by revegetating an overall 10,000 hectares over the project lifetime.

[55] Workers SDG evidence folder – see the workers payment record

[56] Refer to Assessment for SDG 15 (2020–2024) report

1.19 Additional Information Relevant to the Project

Leakage Management

The project does not lead to the displacement of any pre-existing activities that would result in increased GHG emissions beyond the project boundary. In the baseline scenario, livestock did not rely on the degraded scrublands and cropland, as degraded scrubland was predominantly covered with invasive weeds, as detailed in Section 3.4 and cropland was under agricultural crop cultivation restricting the livestock grazing by the landowners. Furthermore, there was no displacement of agricultural activities beyond the project area. In the baseline year 2020, about 13% of the land was classified as cropland, belonging to landowners with freehold ownership who voluntarily participated in the program. These landowners opted for plantation establishment as agriculture productivity on their lands was low owing to the infertile or low productive soil. Since, landowners have not converted 100% of their holdings to the ARR project activity. Instead, each participating landowner has intentionally retained a portion of their land for subsistence agriculture to meet their household food needs hence the need for them to practice agriculture elsewhere for meeting their food needs is out of the question. As a result, no displacement occurred during project implementation. Moreover, the project will monitor any agriculture displacement at every verification event during the project life-time and account for any leakage emissions as a part of the management plan.

The LULC assessments along with the ground surveys carried out during the monitoring activity to understand and determine any agriculture displacement concluded in zero displacement activities happened as a result of project activity.

Commercially Sensitive Information

The public version of the project description does not contain any commercially sensitive information.

Further Information

This is not applicable since all the necessary information is included in this project description and other relevant documents.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

The project prioritizes local stakeholder consultation to ensure that all identified stakeholders' inputs and impacts are considered in line with international carbon standards. The primary objective of these consultation activities was to engage both primary and secondary stakeholders, familiarizing them with the project's activities, execution plan, benefits, and potential risks. These consultations facilitated a comprehensive understanding among stakeholders of how the project's goals and outcomes align with community needs and aspirations, while also identifying opportunities for further enhancement.

2.1.1 Stakeholder Identification

Stakeholder Identification	To ensure a collective involvement and justified distribution of the project direct and indirect benefits, a systematic approach has been taken to identify the stakeholders that could be affected by the project. Mention below a detailed approach taken to identify pertinent stakeholders – **Identification of Primary Stakeholders** i. Desk Study: A comprehensive study was conducted to understand the existing vegetation cover and land degradation trend in Uganda.

ii. Ground verification and identification of

Picture 15: Online Meeting with Village head and Local Council of Kampala

landowners: ground verification of land use was conducted through meetings with village heads and local councils in regions where unused lands were identified. The village heads introduced the proponent to the owners of the identified land parcels in their villages.

iii. Identification of associated stakeholders groups: Through meetings with the landowners, associated stakeholder group have been identified who maybe directly or indirectly will be impacted by the project.

Associated primary stakeholder group - Local community members surrounding to the plantation sites.

Picture 16: Meeting with Local Community Members surrounding to the plantation site

Identification of secondary stakeholders

i. The geographical scope of the project zone is divided into three regions: Northern, Central, and Western Uganda. Within these regions, the first planted area covers 3324 hectares, marking the first instance of the project.

ii. The stakeholder groups, which are either directly associated with the primary stakeholders or can indirectly influence the project's progress in the long run, have been identified for inclusion in this project based on their presence in each region of the project zone.

Following stakeholder groups were identified:

1. Local Community Members
2. Member of village- level local council.
3. Village heads

Picture 17: Meeting conducted with the Village heads and landowners at Kampala

Picture 18: Meeting conducted with Local NGO representatives

Legal or customary tenure/access rights	The entire land under the project area is solely possessed by Landowners[57].The land currently under the possession of landowners are consisting three[58] types of land ownership[59] for different plantation sites within the project areas *(Planted in first Instances)* – 1) Leasehold 2) Freehold 3) Private Mailo

[57] RUBT's Landownership documents

[58] Refer section 1.8

[59] Refer to section 1.8

Stakeholder diversity and changes over time	The primary stakeholders in this project exhibit significant cultural and ethnic diversity[60]. The project spans multiple geographic areas, covering three regions: Northern, central and western. Consequently, there is considerable cultural diversity among the primary stakeholders. In Northern region Acholi, and Baganda is prominent; In Central region Baganda, and Busoga is prominent; In western region Busoga is prominent. However, there are other tribes which can be found mixed in different regions. In the project, most stakeholders speak Luganda as their native language. In some areas, stakeholders speak Lusoga, but they also understand Luganda. To ensure consistent and easier communication and documentation for the field team, Luganda has been chosen for local communication.
Expected changes in well-being	Proponent designed the project in a way where a holistic development can be made both for the landowner and the communities residing in the close proximity of the plantation sites. Following changes are expected in the well-being of primary stakeholders both for the landowners and the communities: Landowners 1) Improved income: Conversion of an ideal asset into a productive asset by planting commercial tree species. 2) Increased competency: Increased competency in the plantation establishment and maintenance by

[60] https://www.britannica.com/topic/history-of-Uganda , https://www.africa.upenn.edu/NEH/u-ethn.html , https://www.gorillatrips.net/top-10-tribes-in-uganda/ , https://core.ac.uk/download/pdf/43093940.pdf

following sustainable practices as per VCS Standard guidelines[61].

3) Increased Risk Tolerance: Carbon financing motivated the landowners in undertaking the risk of investment into the plantations.

4) Increased Resilience against climate change: Landowners made aware of the rapidly increasing climate change which has created a sense of obligation amongst them in adopting and promoting sustainable practices in their daily life.

5) Enhanced relationship with the surrounding communities: The landowners' provision of livelihood opportunities led to improved relationships and greater empathy between the communities and the landowners.

<u>Communities</u>

1) Better financial planning: Livelihoods at their own residential proximity help in cost-cutting in travel to far places in search of livelihoods. This motivates to plan for investing in other basic resources like children education.

2) Improved livelihood to improved Lifestyle: Lifestyle will improve with access to better income for a longer period of time.

3) Increased expertise: Increased expertise in the plantation establishment, management and monitoring opens multiple livelihood opportunities or petty business opportunities to undertake in different areas.

4) Access to basic amenities: Through this project

[61] VCS Standard AFOLU

	landowners have been encouraged to provide food and accommodation to their workers as per the nature of their work. 5) Increased resilience against climate change: Communities made aware of the rapidly increasing climate change which has created a sense of obligation amongst them in adopting and promoting sustainable practices in their daily life.
Location of stakeholders	The location[62] of the stakeholders is in the close proximity to each plantation site. This includes both the landowner and the communities residing closer to the plantation site.
Location of resources	The resources that stakeholders own fall outside the plantation site as per the selection criteria of the land designed by the proponent. The criteria are designed to avoid any disturbance to the native ecosystem or accessibility to the community through the project activity.

2.1.2 Stakeholder *Consultation* and Ongoing Communication

Date of stakeholder consultation	31-January-2021[63] 23 – December - 2021
Stakeholder engagement process	The project follows a systematic stakeholder engagement process as stated below – **A. Group Meetings** i. **Stakeholder Invitation:** In the early phase of the project, the proponent chose to invite the landowners and community members through the

[62] VCS 4888_Landowner database

[63] Details of the dates and consultation meetings would be provided in Local Stakeholder Consultation Report

Village head, enhancing the likelihood of members participating in the consultation process.

- Conducted meeting with the Village heads.
- Provided information around the project.
- Emphasized to invite the owners of the unused land parcels within that village.
- Shared the details on Consultation Date, objective and Venue that is easily accessible to the stakeholders.

ii. **Flow of consultation:** All consultation programs were conducted in the local language (Luganda) which is understood by all the communities.

During the consultation, below meeting flow was followed:

- Begin with a general introduction (Ice-breaking)
- Distribution of Project summary in the local language.
- Discussion on the topics as mentioned below in the table

Topic of Discussion	
1.	What is Climate Change and how is it impacting the daily lives?
2.	Actions of OYU Green Pvt. Ltd. in mitigating climate change
3.	About the project "OYU – Reforesting Uganda for a Better Tomorrow"
4.	Project Risks, and Benefits
5.	VCS Validation & Verification process

6.	FPIC process
7.	Grievance Redressal procedure
8.	Benefit sharing mechanism

- Question & Answer Session

iii. **Consultation documentation process[64]:** The entire session is recorded in a structured format on hard copies, which are then digitized for secure storage and future use into project enhancement.

Following areas have been documented during the consultation:

- Meeting minutes
- Stakeholders Attendance
- Stakeholders Feedback
- Question & Answer discussed during the session.

Picture 19: Stakeholder Consultation Meeting organized at Kampala

[64] Consultation documentation forms can be shared in softcopies

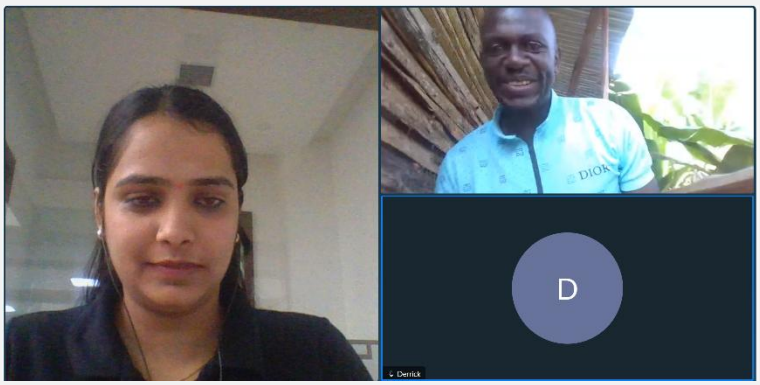
B. **Individual meetings:** A one-on-one interactions conducted with the landowners to resolve any case specific query before getting onboarded into the program.

C. **Online meetings:** Online meeting with the management team is conducted periodically with landowners to ensure transparency in the information disbursement and resolve any case specific grievances.

Picture 20: Stakeholder engagement with the local communities

Picture 21: Stakeholder engagement with the local communities

Picture 22: Individual Meeting with a Landowner



Picture 23: Online meeting conducted with the landowner

Consultation with the workers *(During the execution of the project)*

At the start of the project, which included on-ground plantation activities, workers were hired on both a temporary and permanent basis based on project requirements:

Temporary staff were recruited for specific tasks, such as site preparation, sapling plantation, and transportation from nurseries.
Permanent staff were employed for long-term roles, including managing plantation activities and guarding plantation sites.
A dedicated workshop was conducted to educate workers about their rights, potential risks associated with their tasks, and the safeguards landowners could implement to mitigate these risks.

Workers were also informed about project policies and workers'

rights as outlined in Ugandan law. These policies were explained in detail, provided in hardcopy[65] form to both landowners and workers, and landowners were instructed to display them at a visible location within the plantation site or workstation. The information regarding workers' rights is updated annually to reflect any new laws or rights introduced by the government, ensuring that workers remain informed and up-to-date. This ensured that any newly hired worker would be immediately made aware of these policies either upon arrival or during subsequent consultation sessions.

Following rights[66] were discussed and explained during the Local stakeholders consultation programs:

1. Employment Act No. 6 of 2006: The Employment Act No. 6 of 2006 governs employment relationships in Uganda, outlining provisions related to working hours, leave entitlements, and termination procedures. In alignment with this legislation, workers have been informed about their rights, and the project ensures compliance by providing appropriate working hours and entitled leaves. This adherence guarantees that employees operate under conditions that meet the legal standards established by the Act.
2. Labor Disputes (Arbitration and Settlement) No. 8 of 2006: Provides mechanisms for the resolution of labor disputes through arbitration. In the project there is an arbitration mechanism and grievance mechanism that will be followed to resolve any employment related disputes.[67]
3. Occupational Safety and Health Act No.9 of 2006: Ensures the safety and health of workers in the workplace. For workers safety PPE kit such as gumboots, helmets/caps, basic first aid kit is provided.

[65] VCS 4888_Workers' Rights in Uganda (2024)

[66] VCS 4888_workers rights

[67] VCS 4888_arbitration mechanism

Additional laws and regulations were communicated to the workers and are outlined in the Workers' Rights document that was distributed during the consultation sessions.. [68]

Picture 24: Women workers showing their cleaning tools during the consultation meetings and random monitoring visits made by the project proponent

[68] VCS 4888_workers rights

Picture 25: Workers arriving for consultation meetings

Picture 26: Consultation meeting with workers conducted by the landowners along with the Proponent

Consultation outcome	The consultations helped the project proponent understand the stakeholders' feedback, issues, and concerns related to the

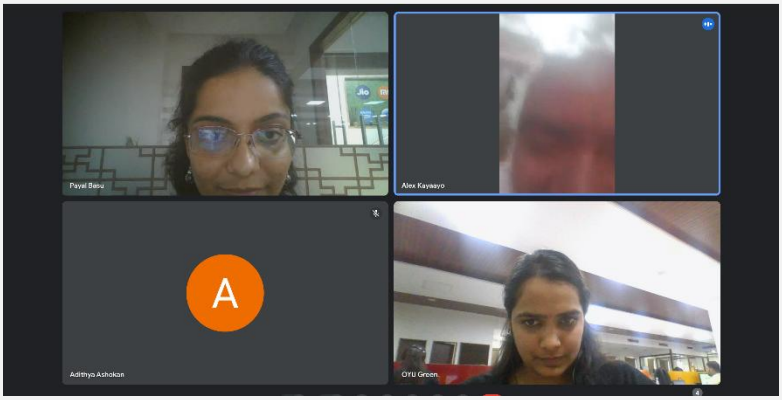
	project activities. Below are some of the outcomes received from the consultation: Some key concerns raised by the stakeholders: - Financial constraints to invest in the plantation establishment - Assurance of successful climate financing - Project time period and consistency in communication - Training and learning opportunities they will receive from the proponent. Some major Insights received through the consultation: 1) Through consultations, the proponent learned the reasons why land remains unused by different landowners, such as: • Financial and technological constraints • Fear of plantation failure • Fear of market unavailability to sell the harvest • Longer gestation period in getting the return
Ongoing communication	To maintain ongoing communication with the stakeholders the proponent organises time-to-time consultations, casual meetings with the landowners and community members. Following mechanism has been followed to maintain regular communication with the stakeholders: 1) Conduct regular consultation meetings with landowners to discuss over the progress, queries and gain feedbacks. 2) Meeting with Village heads and local councils to gain feedbacks and provide progress updates. 3) Casual visits at the plantation sites to meet with workers and communities. These meetings also help in

addressing stakeholder's grievances, maintaining consistent coordination with the community to ensure long term success of the project.

4) Connect with landowners over online meeting to discuss any case specific queries.

Picture 27: Consultation meeting with the local youth and appointed workers

Picture 28: Meetings held with landowners at their sites during Quality assurance



Picture 29: Snapshot of an online meeting with a landowner

Stakeholder input

During the consultation multiple inputs were received from the stakeholders as listed below;

Inputs received	Response provided/Action taken
Landowners: How will proponent ensure transparency within the project activities and among	Through regular stakeholder consultation programs, establishing robust Grievance redressal channel and

the landowners?	creating a channel of official communication through OYU Green's on ground team.
Local communities: What is the recruitment criteria that will be followed by the proponent?	Proponent has prioritized the recruitment of surrounding communities in the project activity through the landowners. Landowners will identify the people based upon their work and skills and recruit in the project activities execution.
Landowners: Proponent should provide manuals along with the training for self-learning	Proponent created manuals and SOPs[69] of the complete execution of plantation activity and has provided its copies to the landowners.
Local communities: How can proponent ensures the health and safety of the workers	Proponent has a strong workplace policies[70] in place at each plantation site. These policies have been provided to the landowners and have been trained to execute effectively.

2.1.3 Free Prior and Informed Consent

[69] VCS 4888_Standard operating procedures documents

[70] VCS 4888_Workplace policies

Obtaining consent	Obtaining consent for project activities is crucial to ensure transparency and stakeholder comprehension about the program. The project proponent has adhered to a clear and respectful communication process to obtain stakeholder consent, free from any coercion or undue influence. Consent taken majorly from the landowners participated in the program. **Consent received upon:** Consent documents structured specifically to receive the consent from each specific stakeholder. **Process followed to receive Consent:** Step 1: During the stakeholder consultation program, proponent provided Clear, Complete, and Comprehensive information to the stakeholders Via following channels: • Written document of Project summary in local language (Luganda and Lusoga language)[71] • Provision of Verbal information, in local language for those who could not read however, all the landowners can read and write both English and Luganda language. Step 2: Clarified any queries or doubts that stakeholders had in timely manner. Step 3: Comprehensively explained the content inside the consent document, clarified queries that stakeholders had in any of the consent condition, and clearly explained requirements, and applicability of those conditions in any carbon project. Step 3: Received consent[72] in the form of signature from the stakeholders.

[71] Project summary document in Lusoga and Luganda language

	With secondary stakeholders a Letter of support[73]/acknowledgement has been received after providing detailed information around the project.
Outcome of FPIC	After being thoroughly aware about the project activities, outcomes and landowners provided their consent and support to the project.

2.1.4 Grievance Redress Procedure

Development process

Below process has been followed to develop grievance redress procedure –

A. Identification of type of grievant that falls within the project scope and capacity of the proponent.

- Landowners who are part of this program
- Local communities residing surrounding to the plantation sites
- Workers appointed by the landowners for the plantation activities
- Village Head/Local councils

B. Division of Grievance type on the basis of different parties involved:

Parties involved	**Major Grievance Type within scope[74]**
Landowner to Proponent: Landowner raising grievance against the proponent.	- Updates on project progress - Trainings and capacity

[72] Consent documents signed by the landowners (refer to the Landowners consent form)

[73] Letter of supports received from secondary stakeholders

[74] Note – The listed grievance types are not exhaustive. Grievances that fall outside the specified categories will also be thoroughly assessed and addressed if they hold significant implications on the surrounding ecology and stakeholders due to the project activity.

		building - Benefit sharing - Proponent team on ground - Plantation growth and maintenance
	Local community to Proponent: Local community raising grievance against the proponent.	- Recruitment opportunities - Inappropriate behavior from the landowner - Inconvenience due to Project activity
	Landowner to the local community: Landowner raising grievance against local community.	- Damage to the plantation - Anti-social or inappropriate behavior with the Landowner - Illegal encroachment
	Local community to Landowner: Local community raising grievance against the landowner.	- Plantation boundary mismanagement - Inconvenience due to plantation - Recruitment opportunities and workplace behavior

C. Creating different channel of grievance submission as per the stakeholder's convenience.

D. Arrangement of team hierarchy who will be involved into Grievance Redressal procedure based upon each division and Grievance type.

Grievance redress procedure	Grievance Submission procedure: 1) For any Grievance, the Stakeholder can reach out to

the Project Proponent through following medium:

- Digitally through Mail as provided for grievance submission during consultation.
- In person to the proponent Point of Contact on the ground, a) during stakeholder or periodic visits by the OYU green team,
- Alternate mediums such as WhatsApp, calls, etc.

Grievance Record:

1) A Grievance register is maintained by the proponent's local community outreach team.
2) For Grievances received digitally Via different channels is stored in a digitized format.

Grievance Validation check:

1) Grievance preliminary validity has to be checked on a standardized criteria such as,
   - Identification of the complainant by name and residence
   - Validation of Grievance type within the project scope, If not have to check for grievance significance within the project.
   - Identification of the Grievance category of involved parties.
2) Post preliminary validation, ground verification is recommended to ensure the grievance validity (Additional)

Standard Resolution procedure:

1) After validation of the Grievance, the team will address it with appropriate actions and provide feedback to the complainant.
2) The community outreach team has to ensure that the Grievance should get resolve within the 15 days of the Grievance submission.
3) If the resolution could not be done through the local team then the Grievances will be escalated to the Program Manager at the Head Office of OYU

Green. The program Manager would be responsible to take the appropriate action and will internally discuss with the management if needed.

4) The management has to ensure that the grievance should be resolve within the 30 days of the submission

5) Regular monitoring and reporting will be done to ensure transparency and timely closure of all grievances.

6) The village head of the respective plantation site locations will serve as a neutral third party and will be consulted in cases of unresolved grievances.

Arbitration process

If either OYU Green or the landowners choose to resolve a grievance through arbitration, a structured mechanism[75] is in place, which has been clearly communicated during consultation meetings with the primary stakeholders. Key characteristics of the Arbitration mechanism are as follows:

1. Neutrality – A fair and impartial process will be followed with an independent arbitrator. The village head will be acting as a neutral third party (jury or the arbitrator) in cases of unresolved grievances.
2. Confidentiality – Dispute resolution proceedings will remain private.
3. Binding Decision – The final ruling by the jury will be the final verdict and have to be accepted by both the parties. The grievances will be referred to the village head/jury if no resolution is achieved at the managing level in the head office of OYU Green.
4. Efficiency – A structured timeline will be followed to ensure timely resolution.
5. Flexibility – A flexible process will be taken on

[75] VCS 4888_Arbitration mechanism

	priority to allow mutual agreement on procedures and arbitrators. 6. Legally Governed – This will be conducted under the Uganda Arbitration and Conciliation Act, 2000. 7. Cost-Effective – The process would aim to minimize litigation costs for both parties. 8. Mutual Representation – Both OYU Green and landowners will have equal representation in the process.

Grievances received	Resolution and outcome
Grievance type: Landowner to Proponent A landowner raised the grievance of insufficient training from the field team in the monitoring which caused failure in marking the sample plot.	Step 1: The grievance team checked the validity of the grievance by visiting the spot where sample plot has to be marked. Step 2: The training team has been questioned on delivering the training to the particular landowner's plantation manager. It was found that the training has been effectively delivered however the manager was finding challenge in following the process. Resolution and outcome: The Quality assurance team visited the site and marked the sample plot along with training the manager and the landowner. The manager understood the process very well.  a)

b)

Picture 30: a/b) Marking sample plot and providing training to the plantation manager of a landowner

2.1.5 Public Comments

No public comments have been received during the public comment period that lasted for 30 days from 23/01/2024 to 22/02/2024.

Comments received	Actions taken
No public comments were received.	No public comments were received.

2.2 Risks to Stakeholders and the Environment

	Risks identified	Mitigation or preventative measures taken
Risks to stakeholder participation	**Landowner:** 1) Lack of transparency	**Landowners** Mitigation 1: a) A robust benefit-sharing mechanism is in

	over benefit sharing. 2) Lack of information and awareness around the project progress 3) Loss of financial investment in the case of project failure 4) Exclusion in the decision making process **Community** 1) Boundary mismanagement	place, prepared with due consideration of all key concerns regarding transparency. b) The landowners are made aware on the benefit sharing mechanism during the consultation program. Inputs to make it more transparent has been received and incorporated. Mitigation 2: c) Proponent conducts a regular stakeholder consultation program throughout the various stages of the project. To keep the landowners informed. d) Community outreach team maintains direct contact with the landowners to educate and inform them about the project's outcomes and forthcoming steps. This approach aims to minimize any miscommunication or communication gaps between the proponent and the stakeholders. Mitigation 3: e) The proponent is following a step-by-step process to comply with VERRA's standard requirements in the project's development, ensuring all documentation is in place and aligns with on-ground implementation. This approach reduces the possibility of project failure. Mitigation 4: f) The proponent employs a structured approach to involve landowners along with the project management team, in the decision-making process. They assess the specific needs and perspectives of each stakeholder group relevant to the decision at hand and actively seek their input to arrive at a well-rounded conclusion. **Community** Mitigation 1:

		a) The landowners and the community are familiar with each other since long time and this creates a sense of kinship among the landowner and the community. Thus the landowner committed to take care of the plantation boundary to avoid any dispute with the community. b) Project boundary are precisely delineated and discussed with the community during the consultation programs. c) Awareness and management of the project boundaries is included during the trainings of the landowners and their workers involved in the plantation activity.
Working conditions	1. Discrimination & Harassment at workplace 2. Lack of training 3. Safety of workers	Mitigation 1: a) Stakeholders are protected against risks of discrimination and harassment, as the Project Proponent is committed to maintaining a safe and conducive work environment. This is ensured through the company's comprehensive workplace policies[76] that address and mitigate such issues effectively. Mitigation 2: a) The landowners and their workers involved in plantation activity received proper training for plantation establishment, management, and monitoring based on SOPs provided by OYU Green to mitigate any possible risks.

[76] VCS 4888_Workplace Policies

		Mitigation 3: b) The workers have been provided with basic Protective Equipment (PPE) such as gumboots, coats, and gloves to work in the field from landowners. Additional benefits provided to the workers include food and accommodation.  Picture 31: Workers wearing PPE kit and gumboots during plantation management activities As part of immediate response and basic amenities, proponent maintains first-aid measures at work premises to minimize potential risks and address any concerns promptly
Safety of women and girls	1. Sexual harassment at workplace 2. Gender based discrimination at workplace	Mitigation 1: a) Project Proponent rigorously enforce anti-sexual harassment policy across all work environments and work-related activities. This policy includes a formal process for submitting and addressing grievances. It allows complainants to report any instances of sexual harassment. b) During the random visits proponent team conducts meeting with the workers and discuss on the workplace environment to ensure they open up conveniently. Mitigation 2: a) Project Proponent is committed to support

		gender equality in its workplace and operations. Gender equality is a major aspect included in the project's workplace policies. b) In case of any such unfortunate incidences, workers can reach out to the proponent team through a well-established grievance procedure.
Safety of minority and marginalized groups, including children	1. Child labor activities in plantation establishment 2. Unfair wages to the marginalized group	Mitigation 1: a) Project strictly rejects the child labor inside their work premises or any activity related to the project. Proponent has incorporated the rejection of child labor in their employment policies and in the project implementation plan. Mitigation 2: b) Village leaders have been engaged in the recruitment process of marginalized groups, establishing a transparent channel for recruitment and empowering both the community and village leaders to speak up and report any incidents that may occur.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	No risk identified	No such activity within the project scope contributes to the significant pollution in the area.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

<table>
<tr><td>Discrimination and sexual harassment</td><td>No instances of discrimination or sexual harassment have occurred till now. The Project Proponent has designed the project activity in such a way that no discrimination or sexual harassment has occurred or will occur during the lifetime of the project activity. Policies are developed to ensure protection from sexual harassment and violence as well as facilitate equal opportunity and respect in all aspects of the stakeholder. Emphasis has also been placed on creating a safe and trusting work environment for everyone involved in the project activities.</td></tr>
<tr><td>Management experience</td><td>Proponent expertise in the development, execution and management of this project is very strong that creates a strong foundation of the project sustenance in the longer run.
<table>
<tr><th>Broadly mentioned areas of expertise in the project (Not exhaustive)</th><th>Core Management Team structure[77]</th></tr>
<tr><td>1. Project Planning & Development
2. Project Monitoring & Evaluation
3. GIS Mapping
4. Baseline & Risk Assessment
5. Community & Stakeholder engagement
6. Technical and Research activities
7. Training & Capacity building</td><td>• Project Manager
• Technical Carbon Manager - Forestry
• GIS & Remote sensing experts
• Data analytics Manager
• Community Development specialists

Work Experience:
• The whole project management team holds experience ranging between 4 to 10+ years in their respective areas of</td></tr>
</table>
</td></tr>
</table>

[77] *Please note that this list contains the major designation, presented in the common language, involved in this project in core management team, the team is bigger and include multiple positions at different levels.*

		work. • Team belongs to different areas of specialization which is required to develop and execute such projects efficiently including – Forestry, PHD holders in Forestry, Researchers and analysts, Management and Social development, sustainability. • Team holds significant experience of working in AFOLU Carbon projects.
Gender equity in labor and work	Equal opportunities have been diligently provided, ensuring gender equity in all aspects, including fair compensation for labor and work. The commitment to gender equality extends across all facets of the project activity, promoting inclusivity and fairness in every aspect of employment.	
Human trafficking, forced labor, and child labor	The project activity categorically rejects the use of victims of human trafficking, forced labor, and child labor in all aspects of the project activity. Stringent measures are in place to ensure that ethical labor practices are upheld, and the project activity is committed to maintaining a workforce free from exploitation, ensuring the well-being and rights of all individuals involved.	

2.3.2 Human Rights

Human rights are usually safeguarded by national and international law as moral precepts or standards for certain conduct standards. These are widely recognized as unalienable, fundamental rights that "everyone is naturally entitled to simply because they are human," and that "everyone is naturally endowed with," regardless of age, place of origin, language, religion, ethnicity, or any other status.

The project promotes the rights of Indigenous Peoples (IPs), in accordance with relevant international human rights laws, including the United Nations Declaration on the Rights of Indigenous Peoples and ILO Convention 169. This commitment ensures the protection of their rights throughout the project's implementation. OYU Green Pvt. Ltd. will uphold the principles and rights at work as defined in the ILO Declaration on Fundamental Principles and Rights at Work (1998) based on the eight ILO Core Labour Conventions.

2.3.3 Indigenous Peoples and Cultural Heritage

No elements of Uganda's cultural heritage are impacted by the project activities, as all project activities will occur on lands owned and taken on lease from NFA by landowners. The project boundaries are precisely demarcated and discussed with the community residing surrounding to the project area. There are no significant cultural sites located within the plantation areas.

2.3.4 Property Rights

Rights to territories and resources	The entire land is owned by private landowners and thus all the rights within the project boundary is solely owned by them. The Project Proponent strictly refrains from any interference with the landowner's tenure. This underscores the project's commitment to recognizing, respecting, and supporting all property rights associated with the land, making an environment of mutual understanding and collaboration.
Respect for property rights	The Project Proponent strongly forbids interfering with the local community members' properties. Stakeholder consultations and awareness programs, procuring FPIC from the stakeholders and timely redressal of reported grievances are the important measures adopted by the Project Proponent to safeguard the property rights of the Local Communities.

2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	Below process was used to design the benefit sharing plan – Step 1: Engaged with landowners during the consultations to understand their expectations and needs and gather input on the benefit-sharing structure.

	Step 2: Analyzed the project goals and assessed the investment and contributions of both landowners and the proponent. Step 3: Based on the investment and roles of both parties, a benefit sharing plan was proposed. Evaluated potential benefits and expenses to ensure fair distribution. Step 4: Developed a legal agreement outlining the benefit-sharing terms. Established a financial model to calculate and distribute net benefits. Step 5: Presented the plan to all stakeholders for feedback. Finalized the plan based on stakeholder input and legal review.
Summary of the benefit sharing plan	The Project Proponent has entered into an agreement with each landowner regarding the roles and responsibilities as well as carbon credit benefits that will be accrued upon issuance.
Approval and dissemination of benefit sharing plan	The benefit sharing plan was reviewed and approved by the landowners by signing a benefit sharing agreement[78]. Landowners had the liberty to consult with their legal counsel and suggest any input or changes required in the plan. The plan was distributed to the landowners via agreement on which they have given their approval of acceptance.
Benefit sharing during the monitoring period	**Implementation of the benefit sharing plan** Step 1: Execution of periodic project monitoring and third-party verification on the ground. Step 2: Post Issuance benefits will be calculated and distributed on pro-rata basis as per the developed and approved financial model.

[78] Refer to Carbon-Benefit sharing plan

	Step 3: Calculated amount will be disbursed through direct bank account transfer to the landowners respectively. Step 4: A brief report on the sales and disbursement of the revenue share will be delivered through mails and hardcopies to the landowners.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measures taken
Impacts on biodiversity and ecosystems	1. Increase susceptibility of Pest and Disease spread due to monoculture plantation 2. Native habitat destruction of areas surrounding to the plantation sites.	Mitigation 1: a) Pest and Disease spread are mitigated by following integrated pest management practices such as: b) Regularly monitoring Tree health and accurately identifying pests and Disease early to avoid the spread. c) Conducting regular inspections to detect early signs of pest and disease problems. d) Maintaining an organized spacing during plantation establishment between two trees and pruning at a regular period is being done to reduce pest habitat and improve air circulation. e) Properly remove and dispose infected plant to prevent the spread of pests and diseases. f) For pests such as anthills, removing the queen method. Is

being used to disrupts the colony's ability to reproduce and grow, leading to a natural decline in the pest population.

Picture 32: Removal of Anthill

Picture 33: Removal of Termite queen

		Mitigation 2: a) As per the proponent's land selection criteria,[79] no such land has been onboarded into this program that consist any native ecosystem within or surrounding to the land parcel.
Soil degradation and soil erosion	1. Soil Erosion 2. Nutrient Depletion due to monoculture	Mitigation 1: a) By conducting tree plantation at the site, the proponent significantly improved soil stability, reducing the risk of erosion. b) Organic fertilizers and natural pest control methods have been used to promote soil fertility and ecological balance. Mitigation 2: a) Applied compost to enhance soil structure and fertility. b) Left all fallen leaves, branches removed during tree brushing, and additional biomass on the ground to act as mulch and retain soil moisture.
Water consumption and stress	No risk identified	Project area demarcated and avoids wetlands, rivers or any natural water resource use in the project activities. Project activities are completely relying on the rainwater since Uganda holds bi-annual rainfall pattern.
Usage of fertilizers	No risk identified	The Project Proponent discourages the use of chemical fertilizers, and

[79] VCS 4888_Land selection criteria

[redacted]		stakeholders have been educated about their adverse effects during capacity-building sessions. Thus, no risk is identified.

2.4.1 Rare, Threatened, and Endangered species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Eucalyptus hybrid (GU7 & GU8– clones developed from Eucalyptus grandis x Eucalyptus urophylla)	Native (Naturalized)[80]	Clonal eucalyptus or Eucalyptus hybrid (including GU7) is important to Uganda's economy, environment and peoples' livelihoods. This is due to its high carbon sequestration potential and ability to produce high volumes of utilisable products in a short time. Its introduction in Uganda has mainly been due to wood deficit– resulting from loss of natural forests, decreasing farm areas, increasing urbanization and the rising need for construction materials[81].	The *Eucalyptus hybrid* plantation in Uganda is free from adverse effects, emphasizing its positive influence on the local environment and communities.
Pinus caribaea	Native (Naturalized)[82]	*Pinus caribaea* is strategically cultivated for commercial purposes. Its popularity within the local	*Pinus caribaea* exhibits favorable characteristics for cultivation in Uganda, as it imposes no adverse

[80] https://www.fao.org/3/J1583E/J1583E00.htm#TopOfPage

[81] Benefits of clonal Eucalyptus

[82] https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1466-8238.2011.00703.x

		community is attributed to its utilization in plantation activities. Over time, these trees have seamlessly integrated into the local ecosystem, becoming naturalized[83], suitable to the area, and integral component in Uganda[84]. It is planted in Africa since the late 17th century[85].	effects on soil or climatic conditions. This, coupled with its commercial properties, makes it a suitable and sustainable choice for tree growth[86].

The project activity ensures no invasive species or species which are known to have detrimental effects on the ecosystem or community will be planted. However, the occurrence of invasive species namely, *Lantana camara*[87] , *Solanum mauritianum*[88], *Dichrostachys cinerea, Senna spectabilis, Bidens Pilosa,* has been reported in the project area. These shrubs grow extremely fast, flower, and set seeds profusely.

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
1. *Lantana camara* 2. *Solanum mauritianum* 3. *Dichrostachys cinerea,* 4. *Senna spectabilis,* 5. *Bidens pilosa,* 6. *Psidium guajava*	Ground slashing and manual eradication are practiced to keep away these invasive species as prescribed in the SOP[89]. Besides, regular inspections of the invasive species within the plantations are done. In addition, utmost care is taken while choosing a location to dispose of mechanically removed invasive plants.

2.4.3 Ecosystem conversion

[83] https://www.fao.org/3/J1583E/J1583E00.htm#TopOfPage

[84] https://www.cabidigitallibrary.org/doi/full/10.1079/cabicompendium.22855

[85] https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/pinus

[86] https://www.intechopen.com/chapters/81792

[87] https://gd.eppo.int/taxon/LANCA

[88] https://gd.eppo.int/taxon/SOLMR

[89] VCS 4888_SOPs Plantation Management and Maintenance

The project activity is implemented on degraded scrublands and croplands. In accordance with VCS Standard 4.7, no intact native ecosystem was converted as part of the project, as no intact native ecosystem existed at the project start date or in the baseline year 2020. By 2020, the vegetation cover in the project area primarily consisted of invasive species, with a scattered presence of a few trees. These trees were identified, demarcated, and will be preserved throughout the crediting period. A detailed explanation of the baseline vegetation cover is provided in Section 3.4 of this PDMR.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	AR-ACM0003	A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands	02.0
Tool	AR-TOOL02	Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities	01
Tool	AR-TOOL03	Calculation of the number of sample plots for measurements within A/R CDM project activities	02.1.0
Tool	AR-TOOL14	Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities	04.2
Tool	AR-TOOL17	Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities	01
Module	AFOLU Guidance	Example for Calculating the Long-Term Average Carbon Stock for ARR Projects with Harvesting	08-March-2011
Tool	AR-TOOL14	Uncertainty Tool under – 'Estimation of	04.2

	(Uncertainty Tool)	carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities'	
Tool	-------	AFOLU Non-Permanence Risk Tool	4.2

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
AR-ACM0003 V2.0	(a) The land subject to the project activity does not fall in wetland category	According to the 2006 IPCC Guideline for National GHG Inventories[90], wetlands are areas intermittently or continuously saturated with water, such as peatlands. They are distinct from forest land, cropland, or settlements, encompassing reservoirs, natural rivers, and lakes. The lands included within the project area have been unused land during the project initiation, none of them were categorized as wetlands as per the Normalized Difference Water Index (NDWI) assessment[91] done within the project area. The NDWI threshold value ranges from -1 to 1. McFeeters, 1996[92] set zero as the threshold. That is, the cover type is water if NDWI >0 and it is non-water if NDWI ≤ 0, a similar approach is followed under the project for the

[90] Publications - IPCC-TFI (iges.or.jp)

[91] VCS_4888_Wetland_Analysis_Report.pdf

[92] The use of the Normalized Difference Water Index (NDWI) in the delineation of open water features

		same.
…	(b) Soil disturbance attributable to the project activity does not cover more than 10 percent of the area in each of the following types of land when these lands are included within the project boundary: (i) Land containing organic soils (ii) Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 1 and 2 to this methodology.	Project Proponent ensures that there is less than 10 percent soil disturbance across the project area, this includes creating pits digging for the plantation purpose with appropriate spacing and pit size. It is ensured that the pit dimension size is 25cm in length and 25 cm in width, such that the soil disturbance is restricted to less than 5%. It is ensured that no activity that can lead to soil disturbance will be performed once the planting activity is completed. The baseline condition consists of degraded scrublands and croplands.
AR TOOL- 02 V01	(i) Forestation of the land within the proposed project boundary performed with or without being registered as the A/R CDM project activity shall not lead to violation of any applicable law even if the law is not enforced. (ii) This tool is not applicable to small-scale afforestation and reforestation project activities.	(i) The project activities outlined in the project are compliant with both national and local laws and regulations as mentioned in section 1.15. Additionally, the lands involved in the project are legally owned by the landowners as per the national legal standards. The statement also asserts that there are no laws prohibiting the commercial tree species plantation on private land. The project is not a small-scale project.[93]
AR TOOL 03	This tool has no internal	The tool has no internal applicability

[93] meth_booklet.pdf (unfccc.int)

V2.1.0	applicability conditions	criteria.
AR TOOL- 14 V4.2	This tool has no internal applicability conditions	The tool has no internal applicability criteria.
NPRR[94] V4.2	1. The risk score selected for the project shall be clearly documented and substantiated in a reproducible way along with all applicable supporting records including all relevant assumptions, parameters, and data sources. 2. Non-permanence risk analysis shall only be applied to GHG removals or avoided emissions through carbon sinks. Project activities generating emissions reductions of N2O, CH4, or fossil-derived CO2 are not subject to buffer withholding since these GHG benefits cannot be reversed.	1. The risk assessment has been carefully conducted as per NPRT guidelines alongside providing with appropriate justification and/or supporting evidence. 2. The current ARR project is concerned with CO_2 removal through carbon sinks (i.e. plantation of *Eucalyptus hybrid, Pinus caribaea*, where there is risk for reversal of the GHG benefits, hence NPRT tool V4.2 is applicable here.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Aboveground Biomass	CO_2	No	Pre-existing vegetation and associated carbon stock can be considered negligible. Baseline emissions are also negligible.

[94] AFOLU-Non-Permanence-Risk-Tool-v4.2-last-updated-May-3-2024.pdf

Source		Gas	Included?	Justification/Explanation
		CH_4	No	Emissions in the baseline can be conservatively ignored. Pre-existing vegetation is not slashed nor burned.
		N_2O	No	Emissions in the baseline can be conservatively ignored. Pre-existing vegetation is not slashed nor burned.
		Other	N/A	
	Belowground Biomass	CO_2	No	Baseline carbon stock or emissions are negligible.
		CH_4	No	Emissions in the baseline can be conservatively ignored
		N_2O	No	Emissions in the baseline can be conservatively ignored
		Other	N/A	
Project	Aboveground Biomass	CO_2	Yes	This is the major carbon pool subjected to project activity and is expected to increase due to the implementation of the project activity
		CH_4	No	Emissions throughout the project are negligible. Therefore, it is conservatively ignored.
		N_2O	No	Emissions throughout the project activity are negligible. Therefore, it is conservatively ignored.

Source		Gas	Included?	Justification/Explanation
		Other	N/A	
	Belowground Biomass	CO_2	Yes	Carbon stock in this pool is expected to increase due to the implementation of the project activity.
		CH_4	No	GHG emissions throughout the project activity are negligible. Therefore, it is conservatively ignored
		N_2O	No	GHG emissions throughout the project activity are negligible. Therefore, it is conservatively ignored
		Other	N/A	

The project boundaries or physical locations have been demarcated as shown in the maps under section 1.13. The KML files for the Project Zone, Plantation area under the first project activity instance, and other relevant documents are directly shared with the VVB.

3.4 Baseline Scenario

The baseline scenario has been identified in accordance with the procedure set out in the A/R Methodological tool - "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (Version 01)[95].

The pre-project land use scenario primarily consisted of degraded scrubland and cropland which remained with private landowners. These lands were left unmanaged, with no significant interventions or inputs due to various barriers.

To understand the historical land use trends, vegetation dynamics and the baseline condition of the project area, Land Use and Land Cover (LULC) classification along with Hansen tree cover assessment were conducted covering the period from 2011 to 2020. The assessments aimed to establish a baseline condition for the land prior to the project implementation in 2021,

[95]Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version01) (unfccc.int)

providing critical insights into past land-use practices and their impact on the landscape. This was achieved by means of baseline surveys[96] and GIS analysis[97].

The baseline survey involved on-ground assessments and stakeholder consultations to understand the land-use patterns and identify key land use changes over time. Whereas, GIS analysis utilized satellite imagery and remote sensing techniques to classify land cover types and quantify their extent.

As per the LULC assessment done for the baseline year 2020 following distribution of the land cover was identified of the total project area –

Table 5: Distribution of different land cover categories[98]

Croplands	13%
Degraded Scrublands	87%
total	100%

The extensive presence of degraded scrubland, characterized by invasive species and sparsely distributed indigenous trees, highlighted the severity of land degradation. Lantana camara, an invasive weed, was found to be widely spread across the project area, posing a significant ecological challenge. Other invasive species identified in the region included *Dichrostachys cinerea and others* [99][100]which have been reported to disrupt native ecosystems and reduce soil fertility. The majority of the land incorporated into the project is leased from the National Forestry Authority (NFA). Prior to leasing, these areas experienced severe degradation due to various anthropogenic activities. Illegal agriculture practices by encroachers was one of the primary drivers of land deterioration, as local communities cleared forested land for subsistence farming, leading to habitat loss. Additionally, fuelwood collection and charcoal production significantly contributed to deforestation, as demand for firewood and charcoal (a type of energy sources) increased over the years.[101] Studies indicate that Uganda's forest cover

[96] VCS 4888_Baseline report

[97] VCS 4888_LULC analysis

[98] VCS 4888_LULC analysis

[99] https://www.monitor.co.ug/uganda/news/national/invasive-plants-threatening-survival-of-kidepo-wildlife-say-experts-4514350?utm_source=chatgpt.com

[100] https://www.iucngisd.org/gisd/

[101] https://www.newscientist.com/article/dn27480-ugandas-forests-dwindle-as-illegal-settlers-hollow-them-out/?utm_source=chatgpt.com

declined by nearly 30% between 1990 and 2015, largely due to unsustainable harvesting for fuel[102].

Though there are multiple driving factors responsible for increased deforestation in Uganda, the commercial production of charcoal contributed significantly amongst the rest.[103] The significant reduction in Uganda's forest cover due to charcoal production is primarily driven by commercial activities rather than subsistence needs of local communities. Urban demand for charcoal has surged, with traders from cities like Kampala sourcing high-quality charcoal from northern Uganda. This trade, referred to as "black gold," has become more profitable than the forests themselves, leading to indiscriminate tree cutting for charcoal production. The National Forest Authority reports that over 73,000 hectares of private forests and 7,000 hectares of protected reserves are destroyed annually for timber and charcoal.[104] To combat this severe degradation caused by human activities, NFA decided to lease degraded land to interested private individuals (with money) and planters for restoration purposes including plantation of commercial tree species.

Majority of the landowners participated in this project have taken the degraded scrubland on lease from The National Forestry Authority (NFA) for establishing commercial tree plantation under the project.[105]. By 2020, activities such as illegal logging, agriculture and charcoal production had severely degraded these lands, leaving them with minimal vegetation or forest cover, rendering them unsuitable for further charcoal production or fuelwood extraction. Consequently, when the landowners received the land, it was predominantly overrun by invasive species with sparse distribution of indigenous (or baseline) trees.

Upon receiving the land, landowners have started executing the plantation activities of commercial tree species that is *Eucalyptus hybrid and Pinus caribaea.* Baseline trees were left untouched in a protected state (status quo) during the implementation of project activity. Furthermore, as part of their commitment in the project, landowners signed the program registration agreement[106], ensuring that harvested wood would not be used for charcoal or firewood, thereby preserving the stored carbon in timber.

The eligible areas considered under the project for ARR activities do not include any forest land in the baseline scenario (t=0). This assessment was carried out following the eligibility (assessment) process, which included multiple layers of remote sensing analysis and ground

[102] https://www.fao.org/4/ac427e/ac427e07.htm#:~:text=State%20of%20the%20Natural%20State,1.2%20million%20hectares%20in%202020.

[103] https://www.newvision.co.ug/category/business/charcoal-firewood-use-not-main-cause-of-defor-NV_166015

[104] https://www.thenewhumanitarian.org/report/94810/uganda-charcoal-boom-bust-forests?utm_

[105] VCS 4888_landownership documents

[106] VCS 4888_Project registration agreement

verification to ensure alignment with the applicability conditions for ARR activities under the VCS Standard v4.7. To confirm that only non-forest areas were included, the PP implemented the following assessments:

1. Normalized Difference Fraction Index (NDFI) Assessment: Conducted to analyse degradation patterns and vegetation trends over the past 10 years.

2. Hansen Tree Cover Assessment: Applied to evaluate existing tree cover against Uganda's national forest definition.

3. Visual Satellite Imagery Interpretation: Performed using Google Earth to cross-verify the results of the above assessments and minimize misclassification errors.

4. Ground Truthing: Executed to validate remote sensing outcomes and confirm land characteristics on-site, particularly in areas identified as potential false positives.

As a result, areas with significant vegetation, either vegetation meeting the 30% crown cover threshold or dense invasive shrubs misclassified as forests in satellite imagery were eliminated from the project boundary. According to Uganda's national forest definition[107], a forest is characterized by:

a. A minimum crown cover of 30% over an area of at least 1 hectare, and

b. Trees height reaching 4 meters and above.

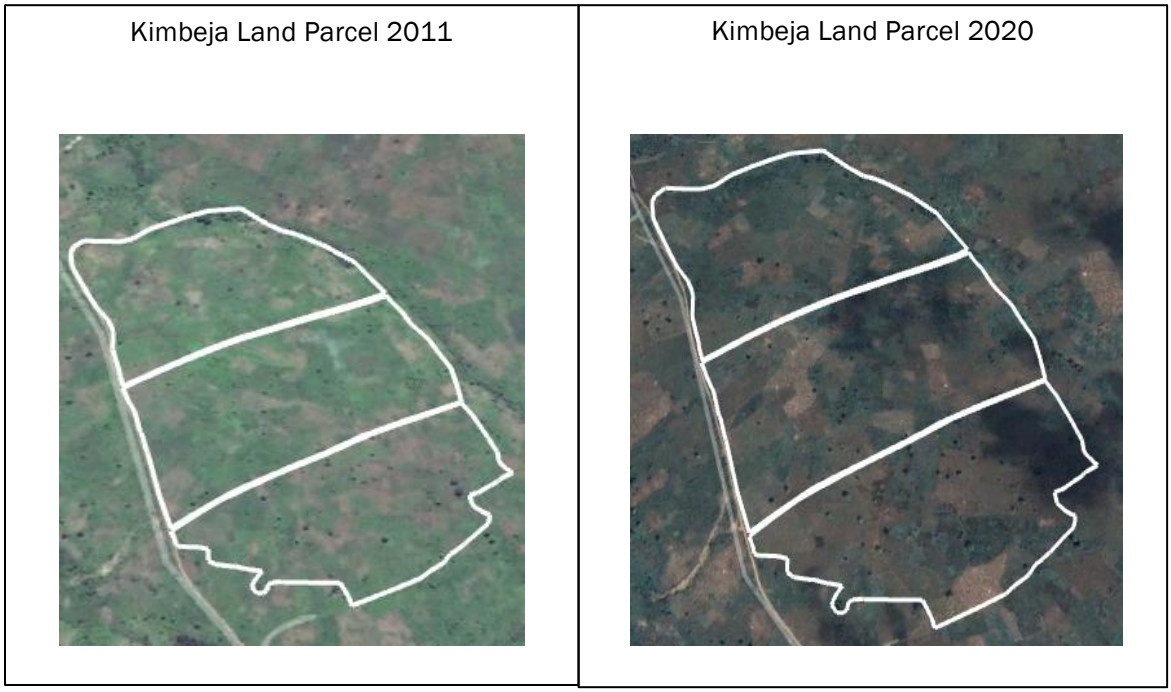
However, Hansen's tree cover assessment detects vegetation starting from 5 meters in height. For the purpose of this project, forest determination applied the threshold of ≥30% crown cover over ≥1 hectare with trees ≥5 meters high, ensuring consistency with national definitions and international reporting standards.

Therefore, it is concluded that, the baseline scenario represents only non-forest areas as per Uganda's national forest definition, and all planting activities under this project fall within the scope of ARR activity as defined by the VCS standard v4.7, appendix 1, Section A1.1.

For the 13% land parcels included in the project under Freehold and Private Mailo landownership, the baseline land use and land cover primarily consisted of cropland. These parcels were previously underutilized with landowners using them for subsistence agriculture or leaving them idle. However, upon joining the project with major portion of their lands, landowners opted to utilize them more efficiently by establishing plantations, offering both economic and environmental benefits.

The majority of the land within the project area consists of degraded scrubland (87%) followed by cropland (about 13%). Thus, the baseline for the project is established as degraded scrublands and croplands.

[107] Uganda's National Forest Definition (see the definition on page #6)

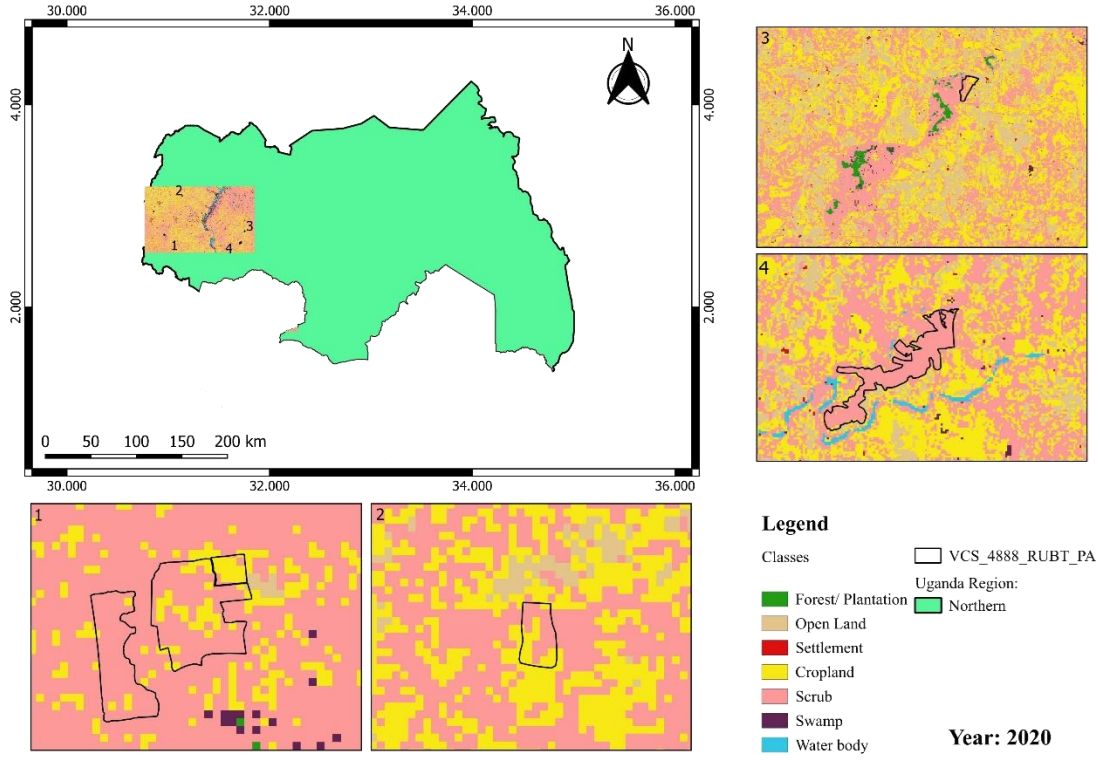


Picture 34: Comparative images of a land parcel in 2011 (left) and 2021 (right) that indicate no native ecosystem has been cleared within the boundary in the past ten years (Source- Google Earth)

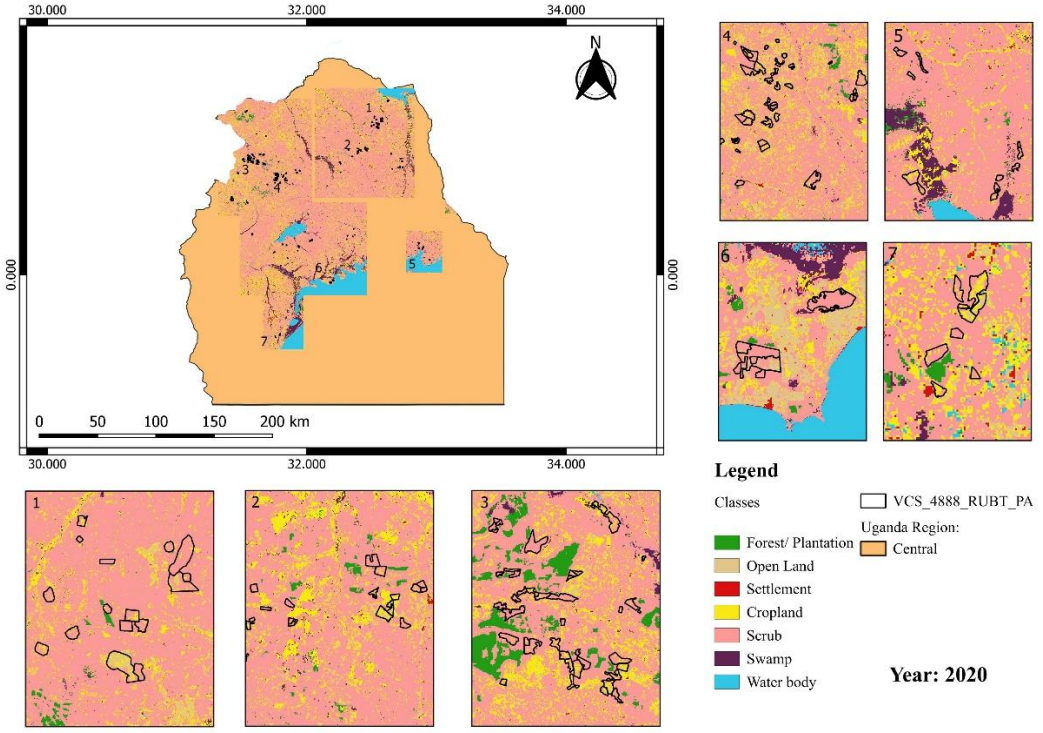
a)

b)

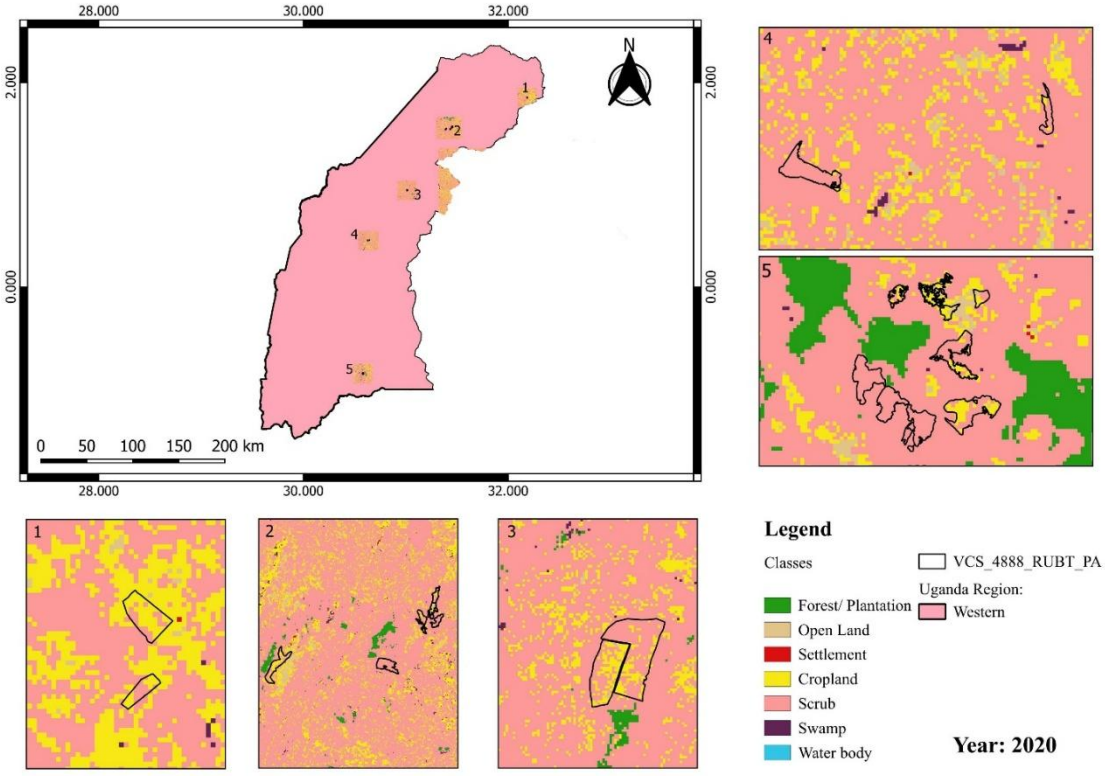
Picture 35: a/b) **Field coordinator surveying the baseline field**



Picture 36: LULC analysis: Northern region (Year 2020)



Picture 37: LULC analysis: Central region (Year 2020)



Picture 38: LULC analysis: Western region (Year 2020)

3.5 Additionality

The Project Proponent has assessed and confirmed thoroughly the additionality of the project and demonstrated it in accordance with the applied methodology and its relevant tools.

A step-wise approach to identify the baseline scenario and simultaneously demonstrating additionality in A/R CDM project activities according to the A/R Methodological tool - "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (Version 01) is covered in section 3.5.2.

3.5.1 Regulatory Surplus

Is the project registered or seeking registration in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country ☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes ☒ No

3.5.2 Additionality Methods

A step-wise approach to identify the baseline scenario and simultaneously demonstrate additionality in A/R CDM project activities according to the A/R Methodological tool - "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (Version 01) is as follows:

STEP 0. Preliminary screening based on the starting date of the A/R project activity

The plantation management activities have been implemented since 01-March-2021, before the registration date and after 31-December-1999, as required by the tool. Carbon finance was considered in the decision to proceed with the project is based on the official meeting minutes. This meeting was organized to discuss the financial viability of the project and the requirement of carbon finance to overcome huge funding gaps. The minutes explicitly state the project's dependency on carbon credit revenue to cover substantial plantation establishment and maintenance costs. The decision to proceed with the project activity was formally contingent upon securing the additional financing via carbon finance. Thus, the decision to develop the project was primarily driven by carbon revenue as the key financing mechanism, ensuring its long-term sustainability. The decision was taken prior to the initiation of the project[108].

STEP 1. Identification of alternative land use scenarios to the proposed A/R project activity

The project activity has identified and assessed two potential alternative scenarios, and out of these, the most credible baseline scenario has been determined.

[108] VCS 4888_additonality evidences

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

The alternative scenarios are described below:

Alternative scenario 1. Continuation of the pre-project land use i.e., degraded scrublands (87% project area under leased land) and croplands (13% project area under subsistence agriculture)

The pre-project land use scenario refers to managing and utilizing the land in the same way as before the project commenced. In all plantation sites, this use primarily involved degraded scrublands and croplands, characterized by sparse to dense shrubs—mainly invasive species—and scattered pre-existing trees. Uncontrolled illegal logging for commercial charcoal production and poor land management practices have significantly contributed to this degradation, as confirmed by GIS LULC analysis[109].

The croplands hold a small portion of the project area (i.e. 13%), where landowners carried out agricultural activities. Upon joining this program, they opted to establish plantations to enhance soil fertility, which had been compromised by prior agricultural practices. This demonstrates that the land's use remains consistent with its historical or existing function, without any major alterations or intrusions, and thus poses no barrier to its credibility or legality.

Alternative scenario 2. Establishment of plantations within the project boundary without being registered as the ARR VCS project activity.

This scenario refers to using the land for afforestation activities with commercial timber tree species (such as Pinus caribaea, Eucalyptus hybrid, etc.) without the use of carbon revenues; i.e. in this scenario, the land has not undergone the official registration process as a VCS (Verified Carbon Standard) project. Uganda's National Forestry Policy acknowledges the value of commercial tree plantations in reducing pressure on natural forests and boosting the nation's economic development[110]. Uganda's wood-based economy is becoming more and more dependent on plantations. Sawn wood and poles, the most valuable industrial wood products in the country, were worth a combined US$190 million in 2015, or 70% of the country's total wood product production value[111] . Thus, it is credible and practicable to establish high-density monocultures (about 1,100 trees/ha) of commercial tree species, such as Eucalyptus hybridor Pinus caribaea, for the purpose of producing timber in the area, as long as the landowners can afford the initial investment.

[109] VCS 4888_LULC Report

[110] https://www.nfa.go.ug/images/UgandaForestryPolicy2001.pdf

[111] https://documents1.worldbank.org/curated/en/099310006212237360/pdf/P17862700d922f0508e1a0d4b8ca048f50.pdf#page=9&zoom=100,92,96

Outcome of Sub-step 1a: All the above-7mentioned alternative scenarios (i.e. scenarios 1 & 2) are credible and would have occurred on the land within the project boundary of the ARR project activity.

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

Scenarios 1 and 2, are viable alternative land-use options for the ARR VCS project both of which fully comply with all applicable laws and regulations, regardless of their active enforcement status in Uganda.

(Note: Though, the establishment of tree plantations is an encouraged activity by the NFA, it is not mandated by any national law or country-wide regulation that compels all lessees to plant trees. The National Forestry and Tree Planting Act of 2003 encourage such activities but do not make them a compulsory legal requirement for all land lease scenarios.)

Outcome of Sub-step 1b: Scenarios 1 and 2 are plausible alternative land use scenarios to the ARR VCS project activity and comply with mandatory legislation and regulations regardless of their active enforcement status in Uganda, while Scenario 2, encounters multiple barriers which will be addressed in the following section. Importantly, it does not violate any presently enforced mandatory laws and regulations.

If the project activity is not implemented, the most probable outcome for this project activity in such a case is that the land will remain the same in pre-project conditions without any significant changes. The lands falling under the baseline scenario have been recognized as degraded scrubland and cropland before any intervention associated with the project activity.

STEP 2. Barrier analysis[112]

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

For the Scenario 1, continuation of pre-project activity i.e., degraded scrublands (87% project area under leased land) and croplands (13% project area under subsistence agriculture), no barriers are identified. On the contrary, Scenario 2, i.e., the establishment of private plantations without the use of carbon finance faces multiple barriers which are described below,

1. **Investment Barriers**

The investment required for the establishment of the plantation or executing restoration efforts on such large scale along with following sustainable forest management practices demands a

[112] As outlined in Section 1.8, the land leased from the National Forest Authority, Uganda, accounts for 87% of the total project area. Therefore, the barrier analysis primarily focuses on this landownership type.

hefty investment. Such investment could only be made by either the Government of Uganda itself or any Private investor.

In accordance with the step 02 (paragraph 13) of the CDM AR-TOOL 02 v1[113], Debt funding is not available for the land-use scenario 02. This is elaborated as follows:

In Uganda, there has been no dedicated debt financing mechanisms available to private landholder (or landowner) for establishing tree plantations activities or Revegetation by private landholder (hereinafter referred to as 'plantation activity'). Also, Government schemes such as the Agricultural Credit Facility exclude, while Uganda Development Bank Limited (UDBL) and donor programs such as Farm Income Enhancement and Forestry Conservation Project (FIEFOC) (a Government of Uganda program co-financed by the African Development Bank (AfDB)) focus on other sectors or operate at community/government levels rather than debt funding for plantation activity. Existing support is limited to non-cash contributions such as seedlings and technical guidance from the National Forestry Authority, which comes at a cost.

The constraints to obtaining debt financing for tree plantation by private landholder can be summarized as follows:

a. **Bank of Uganda's Agricultural Credit Facility (ACF):** The ACF is a fund set-up by the Government of Uganda in partnership with commercial Banks, Micro Deposit- Taking institutions (MDIs), Credit institutions & Uganda Development Bank Limited (collectively known as Participating Financial Institutions (PFIs)) to promote commercialization of agriculture through the provision of short, medium, and long-term financing to projects engaged in agriculture, grain trade, agro-processing, modernization and mechanization114. However, the scheme is not meant to be used for financing working capital for forestry, purchase of land, planting of trees115, refinancing of existing agricultural loans, and trading in agricultural commodities with the exception other than grain.
b. **Uganda Development Bank Limited (UDBL):** UDBL is a non-deposit-taking Development Finance Institution (DFI) providing innovative financial and non-financial solutions to projects that are identified as having a significant, positive socio-economic impact in alignment with the Government of Uganda's development agenda. The type of projects financed by UDBL comprises116: Agriculture (from primary agriculture – agro-processing), Tourism and Hospitality, Manufacturing, Human capital (health and education), Infrastructure etc. It is to be

[113] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-02-v1.pdf

[114] Bank of Uganda – Government Credit Schemes

[115] Agricultural Credit Facility: What You Need To Know – Bankers Journal Uganda

[116] Uganda Development Bank (see under 'what type of projects do you finance?')

noted, that forestry or tree planting is not specified under the category of projects financed by the UDBL.

c. **African Development Bank's (AfDB) Farm Income Enhancement and Forestry Conservation Project (FIEFOC) 2**:

The Farm Income Enhancement and Forest Conservation Project 2 (FIEFOC 2 – a 5-year project) is the successor project to FIEFOC 1 which was implemented between 2006 and 2012 by the Ministry of Water and Environment (funded jointly by the African Development Bank (AfDB) and Nordic Development Fund (NDF)). FIEFOC 2[117] targets improvements in farm incomes, rural livelihoods, household food security and climate resilience through expansion of rural irrigation schemes together with development of agribusiness and integrated natural resources management.

The second phase[118] is meant to address issues in a holistic manner, i.e., irrigation and apiculture development with watershed management and forest conservation to sustain agriculture production (not monocultures) for enhancement of household incomes: The project has the following four components. (i) Agriculture Infrastructure Development: comprising 5 Small/Medium Scale Irrigation schemes with a total of 4038 ha located in five districts namely: Nebbi, Oyam, Butaleja, Kween, and Kasese (none of which are a part of this VCS project), (ii) Agribusiness Development, (iii) Integrated Natural Resources Management: This component aims to improve the livelihood of people living in the catchment area as well as to promote the sustainable development of the watersheds' resource base through an integrated watershed management (IWSM) to deal with complex natural resources management issues (such as land degradation, climate change, deforestation, and unsustainable farming practices), (iv) Project Coordination and Management. The FIEFOC 2 is not a debt facility for individuals, but a government project supporting forest conservation and agricultural productivity by providing support at government/community level, not private debt finance for plantation establishment.

d. **National Forestry Authority (NFA):** The NFA though encourages private sector plantation activity by giving lands on lease; it comes at a cost of land-lease and long-term maintenance of the plantation (born by the private landholder). Therefore, no loan or debt funds are provided by NFA to the private landholders as a working capital for planting trees or establishing plantation.

e. **Gaps in Uganda's legal and policy framework & their implementation:** As per the Ministry of Water & Environment's safeguards information system for national REDD+ strategy & action plan 2020[119], the tree fund provided for under the National Forestry and Tree Planting Act (NFTPA) had never been established, thus there is poor enforcement of existing policies, laws and regulations w.r.t tree planting funds in Uganda resulting in lack of debt funding availability.

[117] Nebbi District local Government, Uganda

[118] The African Development Bank – Projects and operations

[119] https://mwe.go.ug/wp-content/uploads/2025/06/Safeguards-Information-System-for-National-REDD-Strategy-Action-Plan-June-2020.pdf

f. **Forest management is capital intensive and a long-term investment[120]:** It is particularly true in the case of **tree planting**. Forests are often not accepted as collateral for credit; lending policies favor short-term loans with low risks as opposed to long term maturity periods of trees, while inadequate information and limited understanding of the sector contribute to an inflated perception of risk in forestry; and interest rates are often high with short pay back periods. Such challenges limit access to affordable credit.

Investment barrier for the National Forest authority or Government of Uganda in executing plantations independently

In terms of forest management, there are 698 (1,266,000 hectares) gazetted forest reserves. In addition, another 730,000 hectares are located in national parks and game reserves. The majority of the reserves are less than 1,000 hectares. Of the total gazetted forest reserves, 506 are Central Forest Reserves (CFR) and 192 Local Forest Reserves (LFR). The central forest reserves, which account for 30 per cent of the national forest cover, are managed by NFA and UWA while the Local forest reserves are managed by Local Governments.[121]

The National Forestry Authority (NFA) of Uganda has faced significant financial[122]issues such as insufficient funding[123] and operational constraints[124] that have impeded its ability to effectively manage and restore the country's forest reserves. The forestry sector in Uganda has been challenged by substantial investment needs and limited public financial support. A 2010 report by the International Monetary Fund (IMF) noted that the sector was "almost entirely dependent on donor and private investment," leaving a significant gap in public sector funding necessary to generate adequate tree cover and reduce the existing deficit.[125] These financial challenges have been a driving force behind the NFA's decision to lease out degraded lands to private entities (with money) for plantation purposes, a strategy initiated as early as 2005.

[120] OPINION: Enhancing long term financing for sustainable forest-based industries to contribute to climate action

[121] https://www.elibrary.imf.org/view/journals/002/2010/141/article-A001-en.xml?utm

[122] https://www.elibrary.imf.org/view/journals/002/2010/141/article-A001-en.xml?utm

[123] https://www.monitor.co.ug/uganda/news/national/csos-demand-more-funding-for-environmental-activities-4201852?utm

[124] A 2009 review highlighted that the NFA's progress was undermined by governance issues, frequent staff changes at senior levels, and external pressures, leading to challenges in enforcing regulations and implementing conservation activities. - https://www.norad.no/publikasjoner/2009/review-and-appraisal-mission-report--support-to-the-establishment-of-the-national-forest-auhority-and-sustained-development-of-uganda-national-forestry-authority-with-enhanced-focus-on-northern-uganda/?utm

[125] https://www.elibrary.imf.org/view/journals/002/2010/141/article-A001-en.xml?utm

To address these challenges, the NFA has adopted a strategy of leasing land to private planters/investors[126] for reforestation and commercial plantation activities. This approach not only aids in forest restoration but also alleviates the financial burden on the government.

Investment barrier for the private investors without carbon certification by following similar sustainable forest management practices as being followed in this project[127]

Private investors in this context can be small, medium, or large-scale entities or individuals[128]. While all these investor categories have the opportunity to lease land and invest in plantation activities, their objectives vary. Small (<50 ha) and medium-scale (51-100 ha) investors are usually individuals primarily seeking financial stability by creating income opportunities through commercial timber plantations, whereas large-scale investors are typically entities focus on maximizing profits from their investments.

For any private investors, the financial barriers to initiating and maintaining tree plantations are substantial. The costs involved in establishing a plantation, such as purchasing high-quality saplings, labor for planting, land preparation, and ongoing maintenance, are prohibitively high. Additionally, the long gestation periods required for tree species to mature further discourage landowners from investing in plantations without external financial support.

By adhering to the same timeline for harvesting, thinning, and management practices—such as manual or biological pest control, avoiding synthetic fertilizers, and restricting harvested wood use for fuelwood as outlined in this project, establishing a plantation can cost up to $1819.78 per hectare, including the costs of saplings and labor. Thinning operations alone can cost between $50 to $100 per hectare. Even with these investments, the financial returns from initial and subsequent thinning are often insufficient to cover the costs, making the revenue from carbon credits indispensable for financial viability[129],[130],[131].

[126] In this project, landowners with lease licenses from the NFA are also the planters/investors who have leased land to restore degraded lands through commercial timber plantations. The NFA grants leases to a diverse range of investors, including private individuals, companies, and community groups, to support reforestation. Local individuals have been given the opportunity to lease land, enabling them to establish an additional income source. In this program, only small (<50 ha) to medium scale (51-100 ha) landowners or individuals have participated, primarily aiming to generate revenue through carbon financing for the long-term sustainability of the plantations while adhering to sustainable practices as outlines in this project

[127] This also includes landowners participating in the program, as they have invested in restoring degraded land received on lease from the NFA.

[129] https://www.sciencedirect.com/science/article/abs/pii/S0264837718319872

[130] https://www.researchgate.net/figure/Revenue-cost-analysis-of-field-Eucalyptus-plantations-2-x-I-m-espacement-in-three_tbl1_233449120

[131] https://www.phytojournal.com/archives/2020/vol9issue6S/PartH/S-9-6-24-961.pdf

Parameters	Unit	Value
Land Particulars	USD/ ha/ year	13.6
Directly purchased saplings	USD/ sapling	0.48
Plantation Establishment	USD/ ha	505
Plantation Maintenance	USD/ ha	311
Thinning and harvesting	USD /ha	1111
Management	USD / year/ ha	75
Monitoring	USD /ha	45

Despite the high costs, the revenues from thinning and harvesting are relatively low. For instance, the combined revenue from the first and second thinning and final harvest of Eucalyptus hybrid and Pinus caribaea trees amounts to only $3251 over 20 years. This is insufficient to cover the initial and ongoing costs of $4363 per hectare. Below table highlights the revenues that can be earned from tree plantations in Uganda:

Parameter	Revenue per hectare[132]
First thinning	100
Second thinning	151
Harvest	3000

Small and medium-scale investors leasing land from Uganda's National Forestry Authority (NFA) for plantation establishment face multiple financial, technical, and institutional challenges. A major hurdle is the limited access to affordable financing, as Uganda's financial sector is underdeveloped for long-term forestry investments. Many small investors struggle to secure loans[133] due to stringent collateral requirements, lack of credit history, and the absence of tailored financial products like asset leasing or long-term microfinance. Only about 8% of Ugandans save in formal financial institutions, further limiting credit access for small investors or

[132] Conservative estimations

[133] https://www.fao.org/4/ac427e/ac427e07.htm#:~:text=State%20of%20the%20Natural%20State,1.2%20million%20hectares%20in%202020.

individuals.[134] With an estimated rate of return of just 5% for eucalyptus plantations, the profitability of forestry investments remains low, making it difficult for investors to sustain operations without external support.[135]

The lack of formal credit options means individual investors often have to use their personal savings to cover the initial costs, further straining their financial resources and making it unsustainable without additional support. Using personal savings means landowners (small and medium scale private investors) are taking considerable financial risk, especially when the returns on investments are long-term. Some landowners resort to high-interest loans from informal lenders to fund their plantations. These loans come with high repayment rates, which can further exacerbate their financial burden and lead to a cycle of debt.

Additionally, for the large-scale investors, one major obstacle is limited market access, primarily due to restrictive timber export policies. Uganda imposes complex approval requirements and lacks standardized grading systems, making it difficult for investors to sell timber in international markets. As a result, domestic timber prices remain low, reducing profitability for large-scale investors (FAO). Additionally, investment profitability concerns further deter investors, as the net present value (NPV) in 2020 of commercial pine plantations in Uganda was negative, ranging between USD -368 and -657 per hectare. This means that, in the existing market conditions, many plantations struggle to generate enough returns to justify the investment[136] . The forestry sector faces market challenges, including an unrealistic pricing system that undervalues timber, discouraging investment and reinvestment. Thus, it discourages the private investors to invest in the large-scale plantation programs.

2. Institutional barrier

Risk related to changes in government policies or laws- The recent interventions taken by the government as mentioned below have led all type of private investors in the plantation activities skeptical about raising plantations on their lands:

a) In the year 2023, the government of Uganda imposed strict restrictions on timber exports that have made the commercial plantation business unprofitable for private investors.[137] In 2020 and 2021, there were occasional discussions and concerns among environmental groups and industry stakeholders about the potential for the Ugandan government to impose a timber export ban, as per the information received during the stakeholder consultation programs. These speculations were primarily driven by growing worries over deforestation and unsustainable logging practices affecting Uganda's forest resources.

[134] https://www.bis.org/review/r131023b.htm?utm

[135] https://www.fao.org/4/AC427E/AC427E06.htm?utm

[136] https://openknowledge.fao.org/items/f517a7eb-b14d-4147-b39a-8bcfb149928f?utm

[137] https://isoko.uweal.co.ug/news/117

b) The export licence required for the export of timber is also difficult and the process is complex which creates another major constraint in the adoption of the commercial plantation at a large scale.[138]

Uganda's timber export ban was implemented due to soil degradation caused by extensive harvesting without corresponding revegetation efforts. To combat this issue and halt further degradation, the government has restricted timber exports. However, licenses may be granted to those capable of replanting or engaging in Revegetation activities.

The government is keen on shifting from timber-based electric poles to concrete electric poles in certain regions of Uganda. As the timber poles have become expensive for the government, they have decided to phase out wood and replace it with concrete-based electric poles.[139] This will lead to a decrease in timber demand for electric poles and thus reduce the timber demand in the domestic market as well, and hence landowners are skeptical about any benefits from plantation activity. So, the carbon project revenue is one important source of revenue that will motivate the farmers to establish plantations on their lands.

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

Scenarios 2 (i.e., Establishment of plantations within the project boundary without being registered as the ARR VCS project activity) is prevented by barriers and is therefore eliminated. Whereas, scenario 1 i.e., the continuation of pre-project land use emerges as the potential baseline scenario as it encounters no barriers.

Outcome of Step 2a: List of barriers that may prevent one or more land use scenarios identified in the Step 1b.

Alternative land use scenarios	Investment barriers	Institutional barriers
Continuation of the pre-project land use		
Establishment of plantations within the project boundary without being registered as the ARR VCS project activity.	✓	✓

[138] http://ufwg.envalert.org/wp-content/uploads/2020/09/FAO-SPGS-Newsletter-Issue8_LowRes.pdf

[139] Making Concrete Electric Poles Is the Way to Go | Sunrise

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

Scenario 2 is prevented by barriers and is therefore eliminated. Scenario 1, the continuation of pre-project activity use where lands remain as degraded scrublands and croplands (under illegal agricultural activities) emerges as the potential baseline scenario as it encounters no barriers.

Outcome of Sub-step 2b: List of land use scenarios that are not prevented by any barrier

Scenario 1 i.e. Continuation of the pre-project land use i.e. degraded scrubland & cropland is the only alternative without barriers. Thus, it is the baseline scenario

STEP 3. Investment analysis (if needed)

Scenario 1 stands as the only potential baseline scenario, rendering investment analysis as not required.

Alternative land use scenarios	**Investment barriers**	**Institutional barriers**
Continuation of the pre-project land use		
Plantation of the land within the project boundary performed without being registered as a VCS project	✓	✓

STEP 4. Common practice analysis

In accordance with the Step 4 of the CDM AR Tool 02 v1.0, the diffusion of similar reforestation or commercial forestry activities w.r.t their scale, funding element, and geographical area are defined as follows:

a. Scale: The project comprises small scale (<50 ha) and medium scale (51-100 ha) landholders with leasehold ownerships constituting a summed project area of 2891.9 ha (87%). Whereas, 432.12 ha (13%) is combinedly under Private Mailo and freehold land ownerships[140].
b. Funding of the plantation activity (or project activity): The initial funding or cost of the project activity is being born by individual landowners (i.e. the project stakeholders) without the carbon finance.
c. Geographical area: Uganda (specifically leased lands under small & medium scale landowners, and landowners with private Mailo & freehold type)

A quantitative review was carried out in-line with para 32 of the CDM AR Tool 02 v1.0 to assess such activities either already implemented or underway since December 31, 1989, excluding other registered carbon projects (on verra registry & other alike platforms).

The review showed failed & unsustainable diffusions of similar reforestation or commercial forestry activities w.r.t the aforementioned defined scale, funding element, and geographical area. It is elaborated below.

Uganda's forestry sector has seen modest plantation growth since the post 1989 liberalization, expanding over 84000 ha by 2019[141]. The National Forestry Authority (NFA), Uganda after coming into existence (2004), developed a Plantation Strategy in 2005 setting aside 200,000 ha of land for plantation development (50,000 ha by NFA and 150,000 ha by the private sector). NFA itself had planned to plant 2,500 ha per year and, according to available NFA records, it managed to plant 13,500 ha as of 2010[142]. It was observed that the total area under commercial plantations in Uganda had crossed 84000 ha by 2019[143] most of which was either owned or funded by the big organizations. Whereas, the data for scale of diffusion of similar plantation activities by small (<50 ha) or medium scale (51- 100 ha) landholders on NFA lands) is not available since 2004 (since NFA came into being), hindering precise comparison between scales.

However, the information realized during baseline surveys and via review of available public data (w.r.t the aforementioned) shows that, though these activities had been tried, they are significantly less diffused and with high failure rates leading to non-compliance, such as failure to plant or sustain, affecting thousands of small holders due to financial or resource barriers resulting in cancellation or revocation of lease licenses.

Since inception of similar activities (i.e. plantation activities), these are primarily dominated by large-scale investors or big private companies. These are:

[140] Landownership database

[141] *Assessment of the Ugandan commercial timber plantation resource and markets for its products

[142] Forest-plantations-and-woodlots-in-Uganda.pdf (refer to page #17 of the pdf)

[143] *Assessment of the Ugandan commercial timber plantation resource and markets for its products

Table 6 Large-Scale Plantations of private organizations on NFA Land (figures from 2010-2011)[144]

S.No.	Company	Ownership	Area (ha)
1	New Forest Company	Private	7320
2	Green Resources Ltd	Private	5791
3	Global Woods	Private	2600
4	Nileply Ltd	Private	1500

Table 7 Commercial plantation area by private organization[145] (2019)

Period	Green resources	Global woods AG	NFA	New Forest Co.	Nileply	SPGS	Total
1990-2003	619	7	680	0	1450	67	2823
2005-2013	5249	4478	9085	7083	3697	15757	45384
2014-2019	844	4206	679	4574	853	25000	36155
Total	6711	8690	10445	11657	6000	40824	84327

1. New Forest Company have concentrated their planting at Namwasa and Luwunga central forest reserves and by the end of 2009 they had planted a total of 3 546 ha, which has increased to 7 320 ha as of 2011. The company has an overall area of 18000 ha under plantations as of 2024[146].
2. Green Resources Ltd. have planting in two central forest reserves i.e. Bukaleba and Kachung and by the end of 2009 they had planted a total of 3 727 ha, which has reached a total of 5

[144] FOREST PLANTATIONS AND WOODLOTS IN UGANDA

[145] *Assessment of the Ugandan commercial timber plantation resource and markets for its products

[146] AgDevCo - New Forests Company

791 ha as of 2011. Green Resources' Ugandan subsidiary, **Busoga Forestry Company (BFC),** has two plantations in Uganda, Bukaleba (4300 ha) and Kachung (2000 ha) as of 2022[147].

3. **Global Woods** have plantation in in Kikonda central forest reserve. By the end of 2010, they had planted a total of 2 600 ha. The company had an overall area of 8291 ha under plantations as of 2020[148].
4. **Nileply Ltd**. has plantations in South Busoga and have planted 1 500 ha as of 2011. Nileply owns over 15,000 acres plantation in Nakasongola and Kamuli. The plantation in Nakasongola is the company's largest with 10,000 acres while the plantation in Kamuli is 5,000 acres. Nile Plywoods grows an additional 700 hectares per year[149].

The failure of implementing and sustaining such activities by small or medium scale landholders on NFA lands are evident of mass revocations of lease licenses. In 2013, an NFA policy notice specifically targeted withdrawal of unsued licenses from private tree farmers. Subsequently, in 2014, NFA planned to revoke >2000 licenses for non-utilization, affecting smallholders unable to sustain the plantations due to costs; by 2015, about 1200 tree farmers' licenses were at stake awaiting license cancellation for failure to sustain plantation.

These revocations, often for underutilization or contravention, highlight financial unsustainability for small or medium scale land holders. On the other hand, large scale landholders did not face any such failures, benefitting from availability of hefty working capitals with them.

Following are select cases substantiating the failure of small or medium scale (as defined under the project) plantations on NFA lands:

Case 1: NFA policy notice targeting withdrawal of licenses from small scale landowners

In September 2013, the NFA, issued a policy notice to withdraw land and cancel licenses from all private tree farmers who failed to utilize their lands for sustaining plantations.

Case 2: Mass revocation of Over 2000 Licenses for Non-Utilization (2014)[150][151]

As per The New Vision newspaper (a government-owned Ugandan conglomerate) (2014), NFA moved to revoke licenses of over 2,000 individuals and companies, many smallholders, for failing to utilize allocated lands for plantations.

Case 3: National Forest Authority (NFA) to Cancel up to 600 Licenses (2023)[152]

[147] Uganda – Green Resources

[148] Verdant Capital advised the IWC on the sale of Global-woods : Verdant Capital

[149] About Nile Plywood Ltd (Uganda)

[150] https://allafrica.com/stories/201504080309.html

[151] The New Vision - The National Forest Authority is moving... | Facebook

According to Ugandan news agency Uganda Radio Network (URN), The National is to cancel up to 600 licenses that were issued for tree planting in the different central reserves.

Dennis Kavuma, the General Manager of the Uganda Timber Growers Association welcomed the decision by NFA and said,

"Their plea has always been that government allocated the central reserve lands to people who can use them, than rendering them redundant" He further adds "The agroforestry business is very expensive to run and requires a lot of patience, and these could be some of the reasons why the affected people, might have failed to utilized the offers they were given" clearly implying that the associated or required cost of planting trees has resulted in such failures (or cancellation of licenses).

Whereas, Moses Muhumuza, the NFA Legal Manager on the decision said, "We license people or allow people to come and work in these reserves because as NFA, we cannot afford to plant in every central reserve. We came up with an ideal to let Ugandans who have money, invest in these reserves and make money out of it" clearly implying that the lease licenses were meant for the ones with money or working capital to sustain the business. In light of such a decision by NFA it is also evident that people who had invested in such lands to plant trees could not sustain the plantations (or business) and hence their licenses were revoked.

As a result of unavailability of precise statistics on the small (<50 ha) & medium scale (51 – 100 ha) plantation diffusion on such lands, with most data aggregated into broader categories like 25 - 500 ha, making the exact assessment w.r.t scale of diffusion not feasible. Therefore, the PP has relied on the first-hand information received during baseline surveys and publicly available information to evaluate the diffusion and associated issues.

It is concluded that similar forestation activities w.r.t the small (<50 ha) & medium scale (51 – 100 ha) on such lands exhibit very less diffusion (vis-à-vis large-scale diffusions) since 1989 or the year 2004 (NFA came into existence) which could not be sustained owning to the associated expensive costs & COVID-19 circumstances.

This is a **first of its-kind initiative**, possible via combined efforts of small and medium scale landholders who have come together for the execution of the project activity principally dependent on the revenues through sale of credits for its long-term sustenance. One of the most essential distinctions of the 'RUBT Uganda' initiative (this project) is that individual landowners have invested the requisite working capital of their own for initial establishment of the plantations in absence of debt funding or intervention from big organizations or investors to fund the planting activities. Also, accrual of corpus required to cover the costs required associated with the establishment long-term sustenance was not possible for any individual (either) small or medium scale landholders. Thus, together they had all formed a union and came to a mutual decision (considering carbon finance) for implementation of the project

[152] NFA to Cancel Licenses in Central Reserves: Uganda Radionetwork

activity while appointing OYU Green Pvt limited as the project management entity who would provide consultancy services to the landholders along with overall development and management of the project.

Reforestation/commercial forestry with long-term rotations by small (<50ha) or medium-scale (51 – 100ha) landowners on NFA-leased lands is not common, as costs associated with sustaining the plantations (& associated operations) cannot be borne by the landowners, rendering it unfeasible without carbon revenue. Limited similar activities which were initiated in the past by enthusiastic small & medium-scale landholders had initial access to funding under the then active funding scheme such as Sawlog Production Grant Scheme Phase I & II unlike the project's small & medium scale landholders. This is elaborated as below,

The Sawlog Production Grant Scheme, Phase III (SPGS III)[153], a joint initiative of the Government of Uganda and the European Union that aimed at increasing income of rural populations by promoting investment in commercial tree planting by the private sector started operations in 2016 and was to be continued until 2020. The small and medium-scale holders (with NFA-leased lands) participating under the project, could not benefit from such scheme as a result of:

A. **Covid-19 restrictions including, country-wide lockdowns, travel ban, fear of death, no incomes etc. hindering the plantation & other business operations.**
- **Fear of death:** By 23 July, at least 12 people had been allegedly killed by security officers in apparent acts of excessive force when enforcing COVID-19 lockdown measures[154].
- **No incomes during the COVID-19 pandemic**: Research results from July 2020 show that many informal entrepreneurs in Kampala had no income at all during the lockdown, and hence had to dip into their own savings, rely on government food support, or ask for help from family or friends to survive[155].
- COVID-19 **restrictions** affecting the business operations till 27 July 2020[156]

B. **Declared end date of 2020 (since planting activities by these landowners started in 2021, 2022 & 2023))**
C. **Surfacing speculations about timber export ban affecting the interest of investors in funding small (<50ha) or medium-scale (51-100ha) long-term plantation projects.**
D. **Fluctuating local market prices of timber following the timber export ban.**

Moreover, in absence of funds the sustainability of plantations by smallholders remains at risk given the limited financial capacity to maintain the plantations through for the long rotation period. Thus, unlike large-scale plantations these (small/medium scale) are neither preferred

[153] SPGS Factsheet.pdf

[154] COVID-19

[155] "Effects of the COVID-19 Pandemic on Informal Entrepreneurs in Uganda | GIGA". *www.giga-hamburg.de*. Retrieved 17 August 2020.

[156] Businesses to reopen as Uganda eases virus lockdown - Timeturk Haber

for investment by big investors nor usually preferred by smallholders given the risk of failure, high sustenance costs and late returns.

Thus, project activity is not the baseline and hence additional.

3.6 Methodology Deviations

The species of Eucalyptus being planted in the project is a Eucalyptus hybrid (GU7 & GU8 – clones developed from the parent species Eucalyptus grandis x Eucalyptus urophylla). Since, an appropriate allometric equation is not available for the Eucalyptus hybrid, taking a conservative approach; Project Proponent (PP) has applied the allometric equation of the parent species i.e. Eucalyptus grandis. This approach is conservative as the hybrid species of eucalyptus are generally known for their rapid growth and attributes, outperforming the parent species[157] and the conservativeness is evident in the comparison between DBH values achieved ex-post and the values used for ex-ante estimations, with the eucalyptus hybrid showing variation in the DBH values achieved in the first monitoring period (01-March-2021 to 31-January-2024).

Table 8 Ex-ante vis-à-vis Ex-post DBH values

Year of plantation	Age (yrs)	DBH values (Ex-ante)	DBH values (Ex-post)
#	#	cm	cm
2023	1	4.72	4.74
2022	2	8	8.15
2021	3	11.8	11.8

(Source: VCS 4888_ERR_Expost_V8)

The project had specified under section 6.2, for the Data/Parameter 'AGB' an allometric equation of tree species 'Eucalyptus spp.' will be used. However, under the same section, the allometric equation provided was of Eucalyptus grandis (as evident in the publication source of the equation) and not of Eucalyptus hybrid. Since, the tree species being planted in the project is Eucalyptus hybrid (and not Eucalyptus grandis) the terminology under the 'AGB' data/parameter has been changed to Eucalyptus hybrid in the current version of the PDMR and employing a conservative approach (aforementioned) the allometric equation will remain the same as in the earlier versions. As a result, this methodological deviation does not negatively impact the conservativeness of the quantification of GHG reductions or removals. Since, Eucalyptus grandis (slow growing) allometric equation is being applied to its fast-growing hybrid or clones an underestimation of the actual biomass accumulated is natural and expected

[157] DENSITY, CALORIFIC VALUE AND CLEAVAGE STRENGTH OF SELECTED HYBRID EUCALYPTS GROWN IN UGANDA Maderas. Ciencia y Tecnología, vol. 16, núm. 1, febrero, 2014, pp. 13-24

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

This first monitoring period consists of the Commercial tree species Plantations that were planted in the years 2021, 2022, and 2023 across 3324 hectares of land involving *Eucalyptus hybrid* and *Pinus caribaea*. The stratum-wise breakdown of the planted area is given in the Ex-Post ER Sheet for each year.

Over the course of three years, an enhancement in both Aboveground and Belowground Biomass was observed. Systematic monitoring of this transformation was consistently conducted by field coordinators, following a designed Standard Operating Procedure[158], thereby ensuring compliance with Quality Assurance/Quality Control (QA/QC) guidelines.

There was no other major activity recorded during the monitoring period that may have impacted the GHG emission removals and monitoring.

5 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline net GHG removals by sinks is the sum of the changes in carbon stocks of the selected carbon pools within the project boundary that would have occurred in the absence of the project activity. Under the conditions of the applied methodology, changes in carbon stock of above-ground and below-ground biomass of non-tree vegetation, dead wood, litter and soil organic pools may be conservatively assumed to be zero for all strata in the baseline scenario.

Baseline Emissions have been estimated in accordance with the selected A/R methodology, Section 5.4 “Baseline Emissions”. Baseline net GHG removals by sinks are calculated as follows:

[158] VCS 4888 Monitoring SOP

$$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{SHRUB\_BSL,t} + \Delta C_{DW\_BSL,t} + \Delta C_{LI\_BSL,t}$$

Where:

$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks in year *t*; t CO_2-e
$\Delta C_{TREE\_BSL,t}$	=	Change in carbon stock in baseline tree biomass within the project boundary in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e
$\Delta C_{SHRUB\_BSL,t}$	=	Change in carbon stock in baseline shrub biomass within the project boundary, in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e
$\Delta C_{DW\_BSL,t}$	=	Change in carbon stock in baseline dead wood biomass within the project boundary, in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in deadwood and litter in A/R CDM project activities"; t CO_2-e
$\Delta C_{LI\_BSL,t}$	=	Change in carbon stock in baseline litter biomass within the project boundary, in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in deadwood and litter in A/R CDM project activities"; t CO_2-e

As per the methodology conditions under section 5.3, stratification is suggested to be done according to major vegetation types and/or land use types. To estimate the net GHG removal by sinks proponent has stratified the baseline project area on the basis of land cover classes comprising only homogeneous land classes as explained in the section 3.4. These land cover classes are: Degraded scrublands and Cropland

Land cover sub classification in the baseline year 2020	Percentage distribution of land cover	Average trees per ha	Average tree cover per ha on the total planted area in first instance[159]
Cropland	13%	0.52	0.34%
Degraded Scrubland	87%		

During the project eligibility assessment for the 2020 baseline scenario, we first conducted a Hansen tree cover analysis. Hansen tree cover assessment is the proportion of the ground

[159] VCS 4888_Hansen Tree cover assessment (Average tree cover of 2020 sheet)

covered by the vertical projection of tree canopies in a forested area. It is a parameter that indicates existing tree cover. Hansen is expressed as a percentage—higher values suggest forest cover (>30% in case of Uganda), while lower values indicate sparse or negligible forest cover (<30% in case of Uganda). This analysis has showed that 94% of the area did not meet Uganda's forest definition, while 6% was classified as forest, with a 13% margin of error. To verify these results, we performed ground truthing and a land use/land cover (LULC) analysis, especially considering the presence of dense shrubs in the project area. Our field visits confirmed that the areas identified as forest in the GIS analysis were dominated by dense invasive shrub cover along with few scattered trees, as further detailed in Section 3.4. The presence of isolated trees does not significantly alter the ecological character of the land, nor does it meet the required thresholds-such as crown cover-for reclassification as forest (that is >30% Hansen in case of Uganda) or demonstrates significant biomass presence, because the dominant vegetation type is still scrubs or shrubs of invasive species. Thus, it makes the land area homogeneous, as it is uniformly characterized by scrub or shrub vegetation despite the presence of a few scattered trees. Given the consistent vegetation type and ecological conditions across the area, stratification as per the heterogenous land cover is not required for the baseline scenario. This simplifies the project design and carbon accounting process.

As the project activity is solely focused on the growth and monitoring of trees, the Project Proponent chooses to account for aboveground and belowground biomass, but chooses not to account for the potential increased sequestration of dead wood, litter, or soil organic carbon. Thus, the baseline for these values shall be assumed to be zero, and the baseline calculation shall be:

$$\triangle C_{BSL,t} = \triangle C_{TREE\_BSL,t} + \triangle C_{SHRUB\_BSL,t} + 0 + 0$$

$$\triangle C_{BSL,t} = \triangle C_{TREE\_BSL,t} + \triangle C_{SHRUB\_BSL,t}$$

To calculate the $\triangle C_{TREE\_BSL,t,}$ and $\triangle C_{SHRUB\_BSL,t}$ project applied the “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” tool (AR-TOOL 14 .V4.2)

As per the section 5(11) of the (AR-TOOL 14 V4.2), Carbon stock in the trees can be accounted zero if all of the following conditions are met:

Conditions applied	Justification
a) The pre-project trees are neither harvested, nor cleared, nor removed	The pre-project trees are properly demarcated and inventoried. There are over

throughout the crediting period of the project activity;	2419 trees [160]demarcated on the ground and have not been cut or damaged during the execution of the project activity and will be protected throughout the project crediting period.
b) The pre-project trees do not suffer mortality because of competition from trees planted in the project, or damage because of implementation of the project activity, at any time during the crediting period of the project activity.	There is always a buffer distance maintained from the pre-existing trees to avoid any competition in growth or damage during the implementation of the project activity.
c) The pre-project trees are not inventoried along with the project trees in monitoring of carbon stocks but their continued existence, consistent with the baseline scenario, is monitored throughout the crediting period of the project activity.	The pre-project trees are not inventoried along with the project trees as those trees are marked and excluded from being counted with the project trees. Additionally, the monitoring of the pre-existing trees is a part of project management plan. During the monitoring it is found that all the trees are still exists on the ground without any damage or mortality.

The vegetation existing in the baseline (t=0) comprise two distinct types:

a. **Sparsely distributed native trees** that were not cleared or removed during land preparation activities. They have been and will continue to be retained throughout the crediting period.

b. **Invasive shrubs** that were cleared or removed for land preparation. The invasive shrub species identified in the project are viz., Lantana camara and Senna spectabilis (a species of genus 'Senna').

[160] List of protected trees is shared with VVB

Moreover, the invasive shrubs for which the carbon stocks were accounted as zero or insignificant followed the indicator (c) under paragraph 12 of the AR tool 14 v4.2, which states: "the presence of plant species locally known to be indicator of infertile land."

Degraded lands are infertile lands

It is emphasized that degraded lands often result from reduced soil fertility stemming from intensive management, poor soil conservation measures, and climate change[161]. Moreover, Soil degradation is the process that lowers the current or future capacity of the soil to produce goods or services. The term implies **a long-term decline in soil productivity** and its environment-moderating capacity (Blum, 1998)[162]. It is the **soil degradation** that lowers the **soil fertility**[163] (or renders it infertile).

Furthermore, the United Nations Convention to Combat Desertification (UNCCD)[164] defines land degradation as reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns such as: soil erosion caused by wind and/or water; deterioration of the physical, chemical and biological or economic properties of soil; and long-term loss of natural vegetation, noting a decline in **soil fertility** as a consequence.

Similarly, the Food and Agriculture Organization (FAO)[165] of the UN defines land degradation as a natural and human-induced process that negatively affects the land's natural functions related to water, energy, nutrient storage, and recycling, leading to a **decline in land**

[161] Mosier S, Córdova SC and Robertson GP (2021) Restoring Soil Fertility on Degraded Lands to Meet Food, Fuel, and Climate Security Needs via Perennialization. Front. Sustain. Food Syst. 5:706142. doi: 10.3389/fsufs.2021.706142

[162] Blum, W.E.H. (1998). Basic concepts: degradation, resilience, and rehabilitation. In: Methods for Assessment of Soil Degradation, edited by Lal R, Blum WEH. Advances in Soil Science. CRC Press, Boca Raton, pp. 1-16

[163] Asio, Victor & Asio, Luz. (2021). Properties, Fertility Status, and Sustainable Management of Degraded Tropical Soils..

[164] UNCCD, 1993

[165] Ziadat, Feras & Zdruli, Pandi & S., Christiansen & L., Caon & M., AbdelMonem & Fetsi, Theodora. (2021). An Overview of Land Degradation and Sustainable Land Management in the Near East and North Africa. Sustainable Agriculture Research. 11. 11-11. 10.5539/sar.v11n1p11.

productivity. It links degradation to a "decline in the productive capacity of soil" and a "diminished capacity of the ecosystem to provide goods and services." Therefore, when a land is degraded, it loses its ability to support plant growth and provide ecosystem services, rendering it functionally infertile for its natural or desired productive uses.

Thus, it is implied that the identified degraded lands in the baseline (via. LULC assessment) are infertile lands.

Invasive shrub, an indicator of degraded or infertile lands

According to the FY 2021 report[166] from the Office of the Auditor General, both invasive and exotic **plant** species in **Uganda** have been responsible for displacing the native species by competing for food, **degrading habitats** and introducing disease, as some are also poisonous to animals. The report also recognizes both Lantana camara and Senna species as invasive amongst other plant species[167].

Furthermore, invasive species are also responsible for reducing native plant biomass by competition[168/169], decreasing nutrient uptake of native plants[170] and altering nutrient cycling. Such impacts on soil nutrient balance potentially lead to the persistence of invasive species, while hampering the recovery of disturbed native communities[171].

Lantana camara is invasive in large parts of Kenya, Tanzania and **Uganda** (Lyons and Miller 1999)[172]. It is very widespread in all three countries and occurs along roadsides**, in degraded lands**, in riparian zones (banks of watercourses), along fence lines and in pastures and parklands, in plantations, forest edges and gaps. It is probably the most widespread terrestrial invasive plant in Africa and its rapid spread is associated with human induced disturbance. Another shrub species i.e., *Senna spectabilis*[173] is also considered to be

[166] FY 2021 report

[167] REPORT OF THE AUDITOR GENERAL TO PARLIAMENT FOR THE FINANCIAL YEAR ENDED 30TH JUNE 2021

[168] Vilà, M., Espinar, J.L., Hejda, M., Hulme, P.E., Jarošík, V., Maron, J.L., Pergl, J., Schaffner, U., Sun, Y. and Pyšek, P. (2011), Ecological impacts of invasive alien plants: a meta-analysis of their effects on species, communities and ecosystems. Ecology Letters, 14: 702-708. https://doi.org/10.1111/j.1461-0248.2011.01628.x

[169] Vilà, M. and Weiner, J. (2004), Are invasive plant species better competitors than native plant species? – evidence from pair-wise experiments. Oikos, 105: 229-238. https://doi.org/10.1111/j.0030-1299.2004.12682.x

[170] Weidenhamer, J.D., Callaway, R.M. Direct and Indirect Effects of Invasive Plants on Soil Chemistry and Ecosystem Function. J Chem Ecol 36, 59–69 (2010). https://doi.org/10.1007/s10886-009-9735-0

[171] Teixeira, L.H.; Yannelli, F.A.; Ganade, G.; Kollmann, J. Functional Diversity and Invasive Species Influence Soil Fertility in Experimental Grasslands. Plants 2020, 9, 53. https://doi.org/10.3390/plants9010053

[172] Factsheet - Lantana camara (Lantana)

[173] Factsheet - Senna spectabilis (Spectacular Cassia)

invasive in parts Tanzania (Henderson 2002) and **Uganda** (Mungatana and Ahimbisibwe 2010)[174].Thus, it is implied that the invasive shrubs identified are known indicators of degraded or infertile lands in Uganda (project area).

Thus, in both the cases above carbon stock and change in carbon stock in Trees and shrubs in the baseline is accounted zero as per the Section 5 of the AR-TOOL 14 V4.2.

$\triangle C_{BSL,t} = \triangle C_{TREE\_BSL,t} + \triangle C_{SHRUB\_BSL,t}$

$\triangle C_{BSL,t} = 0 + 0$

$\triangle C_{BSL,t} = 0$

5.2 Project Emissions

The ex-ante estimations make use of:

a) **Species-wise Growth Curves**: These growth curves outline the incremental changes in Diameter at Breast Height (DBH) based on the age of each tree species. The project activity focuses on identifying Tier-3 information or data and may move to Tier-2 or Tier-1 only when the specific information is missing as per IPCC.

b) **Species-wise Region-Specific Allometric Equations**: The estimation process incorporates region-specific allometric equations for each tree species. Under this method, existing data such as the DBH parameter is used in combination with tree growth models (allometric equations)[175] to predict the growth of trees. This tree-wise data is extrapolated to the total number of trees based on planned tree planting and management. The data obtained from individual trees is used to estimate the data for total number of trees planned for planting and management.

   In case, the region-specific allometric equation is missing, the equation from the same eco-region is identified. Only when the species-specific equation is missing, that the general equation of genus or general equation for trees for that particular region is identified and used for calculation purpose.

c) **Thinning regime**: The goal of thinning is to control the amount and distribution of available growing space using SOP[176]. It influences the growth, quality, and health of

[174] Mungatana, E. and Ahimbisibwe, P.B. (2010).Quantitative impacts of invasive *Senna spectabilis* on distribution of welfare: a household survey of dependent communities in Budongo forest reserve, Uganda. Poster presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September 19-23, 2010.

[175] VCS_4888_ex-ante

[176] VCS 4888 Plantation Management SOP

residual trees. In the context of the project, thinning operations (table 4) will serve several key objectives-

- Enhancing the overall health and growth rates of the plantations, improving resource utilization (such as light, water, and nutrients)
    - increasing the carbon sequestration capacity
    - Promoting a more resilient and productive ecosystem by removing weaker and less desirable trees.

d) **Harvesting regime**: The harvesting component of the commercial tree plantation project is designed to integrate selective harvesting practices, ensuring sustainable yield and long-term ecosystem health. The harvesting Standard operating procedure[177] describes the operational planning of inputs, harvesting methods, and systems that are used at the project area and the reporting of output as well as all Safety considerations during these operations (table 5)[178].

Table 9 Showing thinning regime to be applied for *Eucalyptus hybrid and Pinus caribaea species* in an ideal situation[179]

Thinning Regime		
Species	**Number of thinning**	**Age of thinning**
Eucalyptus hybrid	1st	4th year
	2nd	6th year
Pinus caribaea	1st	6th year
	2nd	12th year

Table 10 Showing harvesting regime to be applied for *Eucalyptus hybrid and Pinus caribaea species* in an ideal situation

[177] VCS 4888 Plantation Management SOP

[178] VCS_4888_Plantation Management_SOP

[179] VCS_4888_Plantation Management_SOP

S.No.	Tree Species	Harvesting Age
1.	*Eucalyptus hybrid*	10 years
2.	*Pinus caribaea*	20 years

Ex-post stratification is consistent with the ex-ante estimation. The Project Proponent has employed the fixed area sample plot-based monitoring and estimating. The determination of the quantity and size of these samples will align with the specifications outlined in AR-Tool14 V4.2 and AR-Tool03 V2.1.0

Ex- ante Estimation –

The project ex-ante estimations are assessed in-accordance with the CDM AR-TOOL 17 for demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R project activities paragraph 5 which allows the use of any allometric equation for aboveground tree biomass in the project scenario.

For the purpose of predicting project's impact in terms of emission reductions (or removals) a linear regression equation (for e.g. y = 6.082LN(X)+5.8546, R-sq.= 0.99; where y is DBH & x is the tree age) can be derived using available data (i.e. age & DBH) from published research article or studies (preferably, project location/region specific). Subsequently, the derived linear regression equation is used to predict the growth of the dependent variable (e.g. DBH or y) with changing independent variable (e.g. age or X).

Furthermore, the growth rates for the DBH (an age dependent parameter in this case) are projected based on the data already published in peer-reviewed journals of repute Therefore, PP would like to emphasize here that, the ERR (tCO2e) projections used are not mere assumptions, but resultant estimations based on derived regression equation with R-square above 0.90.

Applying the principle of conservativeness:

The DBH values used for the purpose of ex-ante ERR calculations are less w.r.t the values derived using the published literature. Following is the comparison between the DBH values for aforementioned:

Table 11 Ex-ante DBH values in comparison with DBH values derived from published literature data[180]

		A		C	
Species	Age	Mean DBH (cm)	Mean DBH (cm)	Mean DBH (cm)	% difference

[180] VCS 4888_Ex-anteV7

name	(year)	Ex-ante estimation	Published literature	Derived values	A w.r.t C	
Pinus caribaea	1	3.5	N/A	4.1	-15.2	A<B
	2	4.7	4.9	6.6	-28.9	A<B
	3	8.4	8.7	9.1	-7.7	A<B

The DBH values used for the estimation of ERRs are conservative in nature given the significant percent difference present between them vis-à-vis DBH values derived from published literature. Similar approach is taken in case of Eucalyptus hybrid as well.

The project includes harvesting in the project management plan. As per the VCS Standard V4.7, ARR project instances with harvesting activities shall not be issued GHG credits above the long-term average GHG benefit maintained by the project activity. The period over which the long-term GHG benefit is calculated shall include at minimum one full harvest/cutting cycle, including the last harvest/cut in the cycle. The long-term average was estimated using the following equations:

$$LA = \frac{\sum_{t=0}^{n} PE_t - BE_t}{n}$$

Where:

LA	=	The long-term average GHG benefit
PE_t	=	The total to-date GHG emission reductions and removals generated in the project scenario (tCO_2e). Project scenario emission reductions and removals shall also consider project emissions of CO_2, N_2O, CH_4 and leakage.
BE_t	=	The total to-date GHG emission reductions and removals projected for the baseline scenario (tCO_2e)
t	=	Year
n	=	Total number of years in the established time period

5.3 Leakage Emissions

The project leakage emissions are assessed in-accordance with:

1. CDM AR-TOOL 15 v2.0 [181]for 'Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity'
2. AR-ACM0003 A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands Version 02.0[182]

[181] AR-TOOL 15 v2.0

[182] AR-ACM0003 A/R Large-scale Consolidated Methodology

Since, no displacement of pre-project agricultural activities is expected to cause, directly or indirectly, any drainage of wetlands or peat lands, hence the tool is not applicable.

Rationale: The baseline scenario or the pre-project scenario identified in the project is the lands (Under National Forest Authority) lying in a degraded state (refer to section 3.4 for more information) in the form of degraded scrublands (i.e. 87%) and croplands (i.e. 13%). These (87%) lands had been procured by the project participants (i.e. landowners) by means of a lease agreement (legally binding) with the Uganda land commission or National Forest Authority (NFA) encouraging that only the land use practices restricted to the establishment and management of commercial tree plantations are to be carried out on these lands with prohibition on planting of agriculture crops with trees (i.e. taungya) (i.e. an agriculture practice) by virtue of its terms and conditions.

Keeping note of the above, it is only appropriate to conclude that agricultural activities are prohibited to be carried out on these (87%) lands. The same is also observed by the Project Proponent (PP) during the baseline survey and had been verified by the VVB via ground truthing of selected land parcels during on-site visits which were found in a degraded state with only a few scattered baseline trees (preserved and maintained under status quo by PP).

According to the paragraph 9, Note 1 of the AR-TOOL 15 v2.0:

"Displacement of an agricultural activity by itself does not result in leakage emission rather, such emission occurs when the displacement leads to an increase in GHG emissions relative to the GHG emissions attributable to the activity as it exists within the project boundary"

Since, the project activity is restricted to only planting of trees on the NFA lands, a national forest body which advocates only plantation activities and opposes agricultural practices such as 'taungya' (evident in the lease agreement), none of the 87% project had been found under the pre-project agricultural activities. This is further corroborated by the results of Land Use and Land Cover (LULC) analysis conducted between 2011 and 2020, showing insignificant area under agriculture activities. The same was verified by the VVB during site visits. Thus, in absence of pre-project agriculture activities, no such activities are being displaced by the project activity. Hence leakage has been accounted as zero for 87% of the project lands under leasehold.

The project has determined that no leakage emissions from the displacement of agricultural activities are expected, for the 13% of the project area (432.12 ha) that was previously utilized as cropland for crops such as groundnuts, sorghum, beans, millets, and sweet potatoes[183].

The transition from agriculture to ARR activities on these land parcels is not an isolated decision but one made with due consideration of persistent challenges faced by these

[183] Uganda - Global yield gap atlas

landowners. The introduction of carbon finance offers a more viable and economically feasible alternative to traditional agriculture, which has been undermined by the following factors:

i. **Low Profitability and Market Challenges:** Landowners consistently face challenges including low and volatile market prices, poor infrastructure for getting goods to market, and high post-harvest losses. This leads to low and unpredictable revenue, making traditional agriculture an unreliable source of income[184].

ii. **Declining Land Productivity:** Widespread land degradation and soil erosion are significant problems in Uganda, leading to declining soil fertility and lower crop yields[185].

iii. **Climate Vulnerability:** Ugandan agriculture is predominantly rain-fed and, therefore, highly vulnerable to the impacts of climate change, including erratic rainfall, prolonged droughts, and increased temperatures. These climatic stressors make crop failure more frequent and farming a riskier enterprise[186].

The project design ensures that this land-use change does not result in the displacement of agriculture activity. Since, landowners have not converted 100% of their holdings to the ARR project activity. Instead, each participating landowner has intentionally retained a portion of their land for subsistence agriculture to meet their household food needs hence the need for them to practice agriculture elsewhere for meeting their food needs is out of the question. The same was confirmed by the PP via;

1. The baseline survey and household questionnaires.
2. Local Stakeholder Consultation (LSC) meetings.
3. Analysis of satellite imagery (e.g. figure 2 below)

[184] CHALLENGES FACED BY THE AGRICULTURAL SECTOR IN UGANDA - Issuu

[185] (PDF) LAND DEGRADATION IN UGANDA: ITS EXTENT AND IMPACT. Commissioned by Global Mechanism with support from the World Bank.

[186] pik-potsdam.de/en/institute/departments/climate-resilience/projects/project-pages/agrica/climate-risk-analysis-uganda-pik-1.pdf

Figure 1 (a). Red polygons showing the plantations. (b), Yellow polygons showing the area kept aside for limited Agriculture.

In accordance with the AR-TOOL 15, Section 6, Paragraph 9, the leakage is estimated as the decrease in carbon stocks on land receiving a displaced activity. As no agricultural activities have been displaced, no such external land conversion is occurring, and thus no associated decrease in carbon stocks is anticipated.

Moreover, note 1 of the tool clarifies that displacement itself does not cause leakage; leakage occurs if the displacement leads to an *increase* in GHG emissions. Since landowners are meeting their food needs on-site on their retained land, no emission-generating activity (like clearing a forest for a new farm) is taking place elsewhere as a result of the project.

While leakage is not anticipated, the project has leakage monitoring system as a safeguard.

It comprises:

a. **Regular Patrols:** Project staff and community patrols will monitor areas adjacent to the project boundary for any signs of new land clearing or agricultural expansion.

b. **Satellite Imagery Analysis:** Annual review of satellite imagery will be conducted to detect any unplanned deforestation or land-use change w.r.t the probable leakage areas surrounding the project area.

c. **Community Feedback:** Ongoing engagement with local communities will be done on regular basis to receive reports of any unauthorized activities.

d. **Forest Fire Monitoring:** Systems are in place to monitor and suppress forest fires, which can be a precursor to illegal land conversion.

In the unlikely event that leakage attributable to the displacement of agriculture is detected in the future, the project is committed to quantifying the associated emissions. The findings will be reported to the Verra Registry and the Validation/Verification Body (VVB), and the quantified leakage emissions will be deducted from the project's net GHG emission reductions and removals in the relevant monitoring period. As such, any leakage emissions attributable to the displacement of agricultural activities are considered insignificant and hence accounted as zero.

Using equation 4 (paragraph 17) of the AR-ACM0003, the -

Leakage emissions shall be estimated as follows:

$$LK_t = LK_{AGRIC,t} \qquad \text{Equation (4)}$$

Where:

LK_t = GHG emissions due to leakage, in year t; t CO_2-e

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t, as estimated in the tool "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity"; t CO_2-e

$LK_t = 0$ (t CO_2e)

5.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

The net anthropogenic GHG removals by sinks shall be calculated by using the formula given in section 5.7 of the AR-ACM0003 V2.0 tool which is as follows:

$\Delta C_{AR\text{-}CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$

Where:

$\Delta C_{AR\text{-}CDM,t}$ = Net anthropogenic GHG removals by sinks, in year t; t CO_2-e

$\Delta C_{ACTUAL,t}$ = Net current GHG removal from reservoirs in year t; tCO_2e

$\Delta C_{BSL,t}$ = Net GHG removals by reservoirs at baseline in year t; tCO_2e

LK_t = GHG emissions due to leaks in year t, tCO_2e

The table given below depicts estimated GHG emission removal-

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated buffer pool allocation (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCU issuance (tCO_2e)
01-March-2021 to 31-December-2021	0	113,310.58	0	28,555	0	113,310.58	107,417.69
01-January-2022 to 31-December-2022	0	270,444.10	0	62,442	0	270,444.10	234,896.38
01-January-2023 to 31-December-2023	0	612,745.04	0	141,924	0	612,745.04	533,902.37
01-January-2024 to 31-December-2024	0	487,493.70	0	94,464	0	487,493.70	355,363.16
01-January-2025 to 31-December-2025	0	732,181.28	0	165,617	0	732,181.28	623,035.11
01-January-2026 to 31-December-2026	0	381,287.04	0	62,961	0	381,287.04	236,853.03
01-January-2027 to 31-December-2027	0	617,918.07	0	88,457	0	617,918.07	332,766.70

01-January-2028 to 31-December-2028	0	705,471.64	0	50,330	0	705,471.64	189,333.23
01-January-2029 to 31-December-2029	0	875,066.46	0	62,803	0	875,066.46	236,255.42
01-January-2030 to 31-December-2030	0	961,457.09	0	40,324	0	961,457.09	151,693.91
01-January-2031 to 31-December-2031	0	-1,466,186.50	0	0.00	0	-1,466,186.50	0.00
01-January-2032 to 31-December-2032	0	-750,196.25	0	0.00	0	-750,196.25	0.00
01-January-2033 to 31-December-2033	0	-152,605.85	0	0.00	0	-152,605.85	0.00
01-January-2034 to 31-December-2034	0	306,205.10	0	0.00	0	306,205.10	0.00
01-January-2035 to	0	631,267.56	0	0.00	0	631,267.56	0.00

31-December-2035							
01-January-2036 to 31-December-2036	0	400,263.48	0	0.00	0	400,263.48	0.00
01-January-2037 to 31-December-2037	0	546,442.02	0	0.00	0	546,442.02	0.00
01-January-2038 to 31-December-2038	0	628,332.82	0	0.00	0	628,332.82	0.00
01-January-2039 to 31-December-2039	0	739,898.42	0	0.00	0	739,898.42	0.00
01-January-2040 to 31-December-2040	0	818,661.17	0	0.00	0	818,661.17	0.00
01-January-2041 to 28-February-2041	0	138,380.43	0	0.00	0	138,380.43	0.00
Total	0	7,597,833	0	797,877	0	7,597,833	3,001,517

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	**Project Zone Boundary**
Data unit	Latitude and Longitude
Description	The Project Zone boundary is fixed during the validation phase which comprises the Northern, Central, and Western Regions of Uganda.
Source of data	Administrative boundary of Uganda
Value applied:	A KML file consisting of polygons highlighting the project zone boundary
Justification of choice of data or description of measurement methods and procedures applied	The Project Zone is selected such that multiple instances can be added to it, being a grouped project. The current plantation area will expand in the future with the support of carbon financing. However, future instances will be restricted inside the project zone boundary.
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**Carbon Fraction (CF_{tree})**
Data unit	t C / t.d.m.
Description	Carbon fraction of tree biomass for species or group of species

Source of data	2006 IPCC Guidelines for National GHG Inventories[187]
Value applied:	0.47
Justification of choice of data or description of measurement methods and procedures applied	Default value as per the IPCC report
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	R_{tree}
Data unit	Dimensionless
Description	Root-to-shoot ratio for species
Source of data	2006 IPCC Guidelines for National GHG Inventories[188]
Value applied:	0.232
Justification of choice of data or description of measurement methods and procedures applied	Uganda mainly consists of the Tropical Moist Forest; thus, the applied value is taken from Table 4.4 of the 2006 IPCC Report with 2019 Refinement which is applicable to all countries of Africa having Tropical Moist Forest.
Purpose of data	Calculation of project emissions
Comments	None

6.2 Data and Parameters Monitored

[187] Publications - IPCC-TFI (iges.or.jp)

[188] CHAPTER 1 (iges.or.jp)

Data / Parameter	Project Area Boundary
Data unit	3,324 Hectares
Description	The Project Area Boundary under the first verification period consists of the total plantation area which is part of the first project activity instance
Source of data	Summation of all the compartment polygon areas
Value applied:	A KML file consisting of the project area under the first project activity instance
Justification of choice of data or description of measurement methods and procedures applied	Demarcation of the project area by walking along the boundary of discrete project areas or land parcels that together create the Project Area Boundary.
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	DBH
Data unit	Centimeters
Description	Diameter of tree at breast height
Source of data	Physical measurements
Description of measurement methods and procedures applied	Measured for all the trees falling under the Permanent Sample Plots, which cover six strata of the entire Project Area
Frequency of monitoring/recording	During the first monitoring period, measurements are taken three years after the project start date. Subsequently, measurements are conducted annually.

Value applied:	*N/A*
Monitoring equipment	Measuring Tape
QA/QC procedures applied	Standard operating procedures[189] ensure accurate and validated data collection for monitoring parameters.
Purpose of data	Calculation of project emissions
Calculation method	The girth of the trees is measured at breast height (1.37m) which is converted to DBH by dividing it by the value of Pi (i.e. 3.14). Such that, DBH= CBH/3.14
Comments	None

Data / Parameter	**AGB**
Data unit	t.d.m/ha
Description	Above Ground Biomass in tonnes dry matter (t.d.m)
Source of data	Calculated Value in Ex-post Calculation Sheet
Description of measurement methods and procedures applied	For calculating the above ground biomass, Project Proponent measures Diameter at Breast height (D) at 1.37-meter height from ground. The measured values are applied to the allometric equation given below to obtain Above Ground Biomass (AGB)-

Tree Species	Allometric Equation
Eucalyptus hybrid [190]	$Y(Kg/tree) = 0.4506*DBH^{2.082}$ Where, Y= Above ground Biomass in Kg/tree DBH = Diameter at Breast Height (cm)
Pinus caribaea [191]	$Y = (0.2035 \times DBH^{2.3196}) \times 1.2$ Where,

[189] VCS 4888 Monitoring SOP

[190] https://www.sciencedirect.com/science/article/pii/S2351989416300646

[191] Tim Pearson, Sandra Brown and David Shoch, in "Assessment of Methods and Background for Carbon Sequestration in the TIST Project in Tanzania," Report to Clean Air Action Corporation, (December 2004)

	<table><tr><td></td><td>Y= Above ground Biomass in Kg/tree DBH = Diameter Breast Height (cm)</td></tr></table>
Frequency of monitoring/recording	During each verification
Value applied:	Please refer the Ex-post Emission Removal Sheet
Monitoring equipment	N/A
QA/QC procedures applied	The tropical general (Biomass) equation used for ex-post (& ex-ante) estimation of carbon stocks in Pinus caribaea is in accordance with the guidelines of AR-TOOL 17, v1, Paragraph 6 and applicable to Uganda (or project area) being a tropical climate country[192]. In applying the aforementioned tool to the project, Section II, Appropriateness of Allometric Equations, was used to determine the appropriateness of the equation. As per section II, paragraph 5 "For ex ante estimation of aboveground tree biomass in project scenario any allometric equation can be used" Whereas, the paragraph 6 identifies that "For ex-post estimation an equation is considered eligible for estimation if it meets one of the following criteria. *(a) The equation is used in the national forest inventory, or the national GHG inventory, of the host Party;* *(b) The equation has been used in commercial forestry sector of the host Party for ten years or more;* ***(c)** The equation was derived from a data set of at least 30 sample trees, and the value of coefficient of determination (R2) obtained was not less than 0.85.* The tropical general (biomass) equation used for the ex-post calculation of Pinus caribaea under the project is sourced from page #43 of the "Sourcebook for Land Use, Land Use Change, and Forestry Projects (Timothy Pearson, Sarah Walker, and

[192] Uganda climate

Sandra Brown, Winrock 2005)"[193]. Thus, the equation satisfies **criteria (c)** (above), as it was developed from a dataset[194] of more than 500 trees with a value of coefficient of determination (R2) as 0.97.

The tropical general (biomass) equation[195] being used for Pinus caribaea is as follows:

$Y = (0.2035 \times DBH^{2.3196}) \times 1.2$

Where,

Y= aboveground dry matter, kg (tree)-1 DBH = diameter at breast height, cm and 1.2 = expansion factor to go from bole biomass to tree biomass.

The species of Eucalyptus being planted in the project is a Eucalyptus hybrid developed from the parent species Eucalyptus grandis (& Eucalyptus urophylla). Since, an appropriate allometric equation is not available for the Eucalyptus hybrid, taking a conservative approach; PP has applied the allometric equation of the parent species Eucalyptus grandis. This approach is conservative as the hybrid species of eucalyptus are generally known for their rapid growth and attributes, outperforming the parent species[196]. The same is evident in the comparison between DBH values achieved ex-post and the values used for ex-ante estimations, with the eucalyptus hybrid showing slightly higher value in the monitoring period (2021, 2022, and 2023)

The comparison is as follows:

Age (yrs)	Ex-ante DBH values (A)	Ex-post DBH values (B)	% difference B w.r.t A
1 year (2023)	4.72	4.74	0.5
2 years (2022)	8.00	8.15	1.9

[193] Sourcebook for land use, land-use change, and forestry projects by timothy Pearson, Sarah Walker and Sandra brown

[194] Tropical General (biomass) Equation Dataset

[195] Tim Pearson, Sandra Brown and David Shoch, in "Assessment of Methods and Background for Carbon Sequestration in the TIST Project in Tanzania," Report to Clean Air Action Corporation, (December 2004)

[196] DENSITY, CALORIFIC VALUE AND CLEAVAGE STRENGTH OF SELECTED HYBRID EUCALYPTS GROWN IN UGANDA Maderas. Ciencia y Tecnología, vol. 16, núm. 1, febrero, 2014, pp. 13-24

	3 years (2021) | 11.81 | 11.88 | 0.6 For more details refer to VCS_4888_expost spreadsheet)
Purpose of data	Calculation of actual project emissions
Calculation method	N/A
Comments	No comments

Data / Parameter	**BGB**
Data unit	t.d.m/ha
Description	Below Ground Biomass in tonnes dry matter (t.d.m)
Source of data	Calculated Value in Ex-post Calculation Sheet
Description of measurement methods and procedures applied	The root-shoot ratio is used to determine the proportion of belowground biomass in relation to the aboveground biomass.
Frequency of monitoring/recording	During each verification
Value applied:	Please refer to the Ex-post Emission Removal Sheet
Monitoring equipment	N/A
QA/QC procedures applied	Standard operating procedures[197] ensure accurate and validated data collection for monitoring parameters.
Purpose of data	Calculation of actual project emissions
Calculation method	Multiplying AGB with Root-to-Shoot ratio.
Comments	No comments

[197] VCS 4888 Monitoring SOP

Data / Parameter	Total CO_2e
Data unit	Tonnes
Description	Total CO_2e sequestered by the trees
Source of data	Calculations
Description of measurement methods and procedures applied	Allometric equations are meant for the estimation of the Above-ground biomass of trees. DBH values are applied to the allometric equations subsequently. The average biomass is calculated for each of the Permanent Sample Plots which is then converted to per hectare Biomass. The per-hectare biomass value is used to calculate the total biomass in a particular stratum. The biomass of all the stratums is summed up and converted to tCO_2e.
Frequency of monitoring/recording	Calculation takes place with each monitoring report
Value applied:	Sum of Above and Below-Ground Biomass which is converted to Carbon Stock with the help of Carbon Fraction, and the Carbon Stock value is subsequently converted to CO_2e by multiplying it with 44/12.
Monitoring equipment	Computer and database
QA/QC procedures applied	Part of overall QA/ QC procedures
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	None

6.3 Monitoring Plan

The monitoring plan has been crafted in adherence to the VCS Standard, v.4.7. requirements, integrating the AR-ACM0003 Methodology titled 'Afforestation and Reforestation of Lands Except Wetlands,' version 02.0, along with all associated tools. The primary objective of this monitoring

plan is to establish comprehensive procedures and assign clear responsibilities for verifying project activities. Furthermore, it aims to accurately quantify the greenhouse gas (GHG) removal resulting from the proposed actions.

The first monitoring was conducted during the first verification period for the entire project area. Following this, annual monitoring of tree parameters will be performed to ensure ongoing accuracy and compliance. It is ensured that once the saplings are healthy enough (such that a high survival rate is ensured) they become part of the monitoring, the saplings are eligible to become part of monitoring along with the trees as per the applicability conditions of AR-TOOL14 V4.2. So, the plantation of years 2021, 2022, and 2023 were found to be appropriate for this first verification.

The specific objectives of the plan[198]:

- ✓ Monitor and verify carbon stock changes in each selected pool for each specified stratum.
- ✓ Verify actual project emission removals.
- ✓ Determine operation, data collection, management, and record procedures, as well as define roles and responsibilities.

The steps involved in the process of assessing Carbon Stock are:

1. **Delineation of the project boundaries**

The project boundary is delineated on the level of plantation sites by combining the area of discrete plantation areas or land parcels where the plantation has been established within the first 3 year from the project start date.

2. **Stratification, Mapping and Sampling Design**

The land parcels within the Project area are initially mapped by the representative of the Project Proponent. This involves visiting each land parcel and cross-verifying the information with the land title records. According to the section 12 (b) of the applied methodology, for actual net GHG removals by sinks, the stratification for ex post estimations is based on the actual implementation of the project planting/management plan. Therefore, for ex post estimations, the project has been stratified according to the project planting year and species plantation. The justification of selection of strata has been given the following table:

[198] VCS 4899_SOPs Monitoring

Parameters	Variants in the project design	Considered for stratification	Impact on Biomass estimation
Type of Species	*Eucalyptus hybrid, Pinus Caribaea*	Yes	Plantation of two different species will impact the biomass estimation across the project area. Thus, considered for stratification.
Plantation Density	Block plantation *Eucalyptus hybrid* – 1111 per hectare or proportionate thereof Block plantation Pinus Caribaea – 1111 per hectare or proportionate thereof	No	As plantation of both the species are consistent with the plantation model type and plantation density, thus it has zero impact on the Biomass estimation. Additionally, the sparse distribution of baseline trees, average tree count per hectare is 0.52, is insufficient to

			significantly influence the plantation density. Nonetheless, to address this, a conservative approach will be implemented during monitoring. This involves extrapolating the number of standing plantation trees (project trees) within the sample plots to estimate overall plantation density, accounting for factors such as mortality reduction and baseline tree presence. Additionally, an error percentage reduction will be applied to enhance the accuracy of

<table>
<tr><td></td><td></td><td></td><td>these estimates.</td></tr>
<tr><td>Plantation Year</td><td>
<table>
<tr><th>Strata #</th><th>Strata ID #</th><th>Year of Plantation #</th><th>Tree Species name</th><th>Total Area (ha)</th></tr>
<tr><td>1</td><td>P21</td><td>2021</td><td>Pinus caribaea</td><td>150.20</td></tr>
<tr><td>2</td><td>P22</td><td>2022</td><td>Pinus caribaea</td><td>65.60</td></tr>
<tr><td>3</td><td>P23</td><td>2023</td><td>Pinus caribaea</td><td>44.22</td></tr>
<tr><td>4</td><td>E21</td><td>2021</td><td>Eucalyptus hybrid</td><td>1922.60</td></tr>
<tr><td>5</td><td>E22</td><td>2022</td><td>Eucalyptus hybrid</td><td>837.46</td></tr>
<tr><td>6</td><td>E23</td><td>2023</td><td>Eucalyptus hybrid</td><td>303.94</td></tr>
</table>
</td><td>Yes</td><td>Date of plantation will impact biomass estimation, hence considered for stratification according to the plantation year. Plantation year will change the Mean Annual Increments in DBH and Height, depicting impact of plantation date on biomass.</td></tr>
</table>

Stratification was defined according to section 5.3 of the "AR-ACM0003 A/R Consolidated Large Scale Methodology Afforestation and reforestation of lands except wetlands Version 02.0". The methodology states that if the distribution of biomass in the project area is not homogeneous, stratification should be performed to improve the accuracy of biomass estimation.

As illustrated above, the distribution of biomass in the Project Area is homogenous considering the plantation density. Hence, the plantation year and the type of species planted are the two parameters considered for stratification. Under this process, homogeneous discrete project areas or land parcels are summed up to create one particular stratum. So, the entire project was divided into 6 strata i.e.

Stratum Number	Species	Age
1	Eucalyptus hybrid	3 years old
2	Pinus caribaea	3 years old
3	Eucalyptus hybrid	2 years old
4	Pinus caribaea	2 years old
5	Eucalyptus hybrid	1 year old
6	Pinus caribaea	1 year old

The data collection and sampling methods follow the SOP[199]. Throughout the project activity, the monitoring team works with permanent sample plots as it is an efficient way to estimate changes in carbon stocks.

Monitoring plots *were* distributed using a stratified random sampling approach for each stratum as per the approach mentioned in the SOP. The location of the Permanent Sample Plots (PSP) was marked on a map and the geographical position (GPS coordinate) was recorded and archived in the database of the project activity. The KML files were produced for each of these PSPs with the help of recorded coordinates.

- **Stratification design**

The stratification of the planting area is done within the Management Plan. A stratum is defined as a management area having defined boundaries and homogeneous silvicultural management characteristics.

The project area has been stratified into multiple strata based on:

- Different species (i.e. *Eucalyptus hybrid* and *Pinus caribaea*)
- Different years of plantation (i.e. 2021, 2022, and 2023)

- **Sampling design**

[199] VCS 4888 Monitoring SOP

Stratified Random Sampling has been used across the project area where the Permanent Sample Plots (PSPs) are laid out randomly across the 6 strata with the help of a GIS randomizer function.

3. **Estimation of the number of sample plots**

The number of sample plots to be laid out within the Project boundary is estimated with the help of AR-TOOL03- 'Calculation of the number of sample plots for measurements within A/R CDM project activities' (Version 02.1.0)

The tool uses formula given below for estimating the number of sample plots to be laid out at within the project area:

$$n = \frac{N * t_{VAL}^{\ 2} * \left(\sum_i w_i * s_i \right)^2}{N * E^2 + t_{VAL}^{\ 2} * \sum_i w_i * s_i^{\ 2}}$$

Where,

n = Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless

N = Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless

t_{val} = Two-sided Student's t-value, at infinite degrees of freedom, for the required confidence level; dimensionless **[t_{val} = 1.645]**

w_i = Relative weight of the area of stratum 'i' (i.e. the area of stratum 'i' divided by the project area); dimensionless

s_i = Estimated standard deviation of biomass stock in stratum 'i'; t d.m. (or t d.m./ha)

E = Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. (or t d.m./ha), i.e. in the units used for s_i **[A default value equal to 10% of the mean biomass stock is used]**

i = 1,2,3..... Biomass stock estimation strata within the project boundary

Approach for calculation-

The Project is using the Winrock Sample Plot Calculator Tool[200] to calculate the number of PSPs required for the entire Project Area, as well as the number of PSPs to be laid out in each of the

[200] https://winrock.org/wp-content/uploads/2016/03/Winrock_SamplePlot_Calculator_2014_0.xlsx

6 strata. This tool is created with the support of AR-TOOL03 V2.1.0, thus meeting all its requirements.

The calculator required a preliminary estimate of Biomass (t.d.m./ha) and standard deviation (t.d.m./ha) for each of the 6 strata, therefore a pilot study was conducted where 15 random points (I.e. Pilot Study Plots) were created uniformly across each of the 6 strata, and the tree parameters were recorded following the monitoring SOP[201]. This information was then used to calculate the Total Number of PSPs required along with the PSPs required under each stratum.

The total number of Permanent Sample Plots was calculated to be 28 as per the Winrock Sample Plot Calculator Tool, but 7 extra plots were added to it as a good practice such that a Total of 35 PSPs were created for the Biomass calculation of the entire Project Area. The Sample Plot Calculator sheet is shared with the VVB.

4. **Laying out permanent sample plots in each stratum with the help of the GIS random function:**

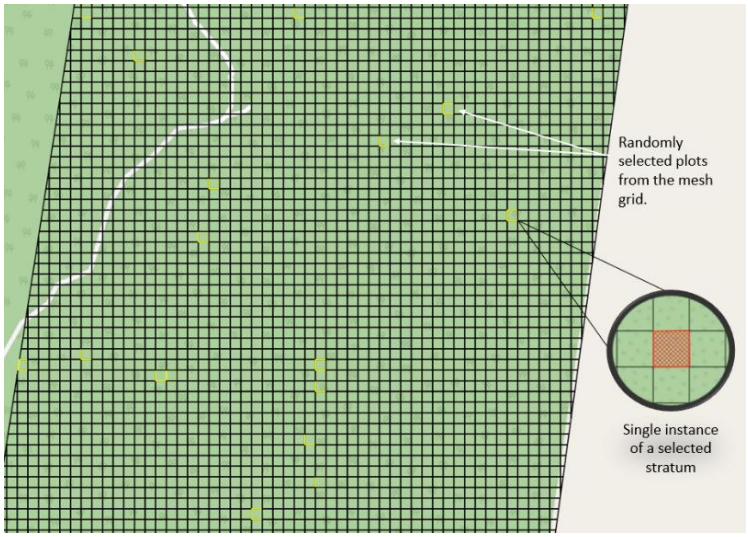
The permanent sample plots are laid out within each stratum with the help of the randomizer function of the GIS Tool and then measurements of the tree parameters were done in the step-wise manner given below:

Step 1: Identification and marking of the permanent sample plots within each Project site

The center points of the sample plots were identified with the help of the randomizer function of the GIS Tool in the following manner:

- KML polygons received for each of the project sites were verified and then a grid was added to the raster layer
- Random points were then generated within the grid for the required number of sample plots
- Selection and extraction of these sample plots was done by color coding with respect to the stratum
- A labeled strata layer was then generated for the project area from which the center location of the sample plots was extracted with the help of the centroid function in the GIS Tool

[201] VCS 4888 Monitoring SOP



Picture 39: Random selection of the sample plots within the project area by using the GIS Tool

Field coordinators were then provided with the geo-coordinates (latitude and longitude) to reach these locations where the square-shaped sample plots were supposed to be laid out. Here, Field coordinators were encouraged to use a high-accuracy GPS device to reach at the most precise location as per availability.

The location that was shared helped in marking the center point of the sample plots and concerning it, the Field coordinators created the square-shaped sample plot by following the monitoring instruction manual internally developed by the OYU Green team.

Picture 40: Marking of square shaped sample plot by field coordinators

Step 2: Delineation of the marked sample plot with the help of a GIS Tool

Field coordinators created the KML Polygon of each sample plot with the help of a GPS Device.

Picture 41: GPS Device for accurate measurement of coordinates

Step 3: Measuring the parameters of all the trees falling under the square-shaped sample plot

The parameter, Circumference at Breast Height (CBH), is measured for all the trees that are falling within each sample plot using the provided Monitoring Template.

Procedure for taking tree measurements -

Circumference of the tree (circumference at breast height i.e. CBH) was measured at 1.37 m or 4.5 feet from the ground. The circumference was measured by wrapping measuring tape firmly around the stem, perpendicular to the axis. To improve the accuracy, a pole was created having a height of 1.37 meters, such that it can be used for repeated tree measurements.

Each tree was marked with a unique serial number while taking the tree measurements to prevent double counting as shown in the figure below.

Picture 42: Marking of trees to avoid double counting in sample plot

Picture 43: Measuring tape to measure the circumference at breast height

Picture 44: Measuring circumference at breast height with the measuring tape at 1.37m height

Field coordinators followed the instruction manual for the Standard operating procedures while taking the tree parameters i.e. Circumference at Breast Height. The procedures ensured that the precautions are taken while taking the measurements and Quality is Assured in the Data monitoring.

For Quality Check purposes, an experienced field coordinator was asked to randomly check the data that has been recorded for various stratums across all the Project Areas.

Monitoring Team Structure:

The OYU Green Team consists of a separate team that is involved in the data monitoring and field measurements. The team involved in data monitoring is responsible for designing the monitoring plan, instruction manuals, and standard operating procedures for the field coordinators while the field coordinators are responsible for executing the plan and taking the measurements such that data quality is assured and recorded properly in the Plantation Inventory Database.

The data monitoring team consists of the managers and experts who have experience in the project design and have the technical expertise to perform the GHG accounting throughout the project's lifetime.

The Field coordinators based in Uganda consist of the Plantation Managers who are trained to easily execute the monitoring plan with proper training that was provided by the data monitoring team with the support of Instruction Manuals and Standard Operating Procedures.

Monitoring Team and their responsibilities:

Unit/team	Roles/responsibilities/*tasks*
Inventory Manager/Leader	• Finalizing the sampling plan • Allocation of sample plots • Oversee the work of compilation • Data analysis and monitoring
QC Team	• Provides training to the field teams • conduct QC measurements
Data Analysis Team	• Check plausibility • Consistency and completeness of data • Analyse the data and generate reports
Field Teams (data acquisition team)	Team Leader- • Develop the fieldwork plan, encompassing the compilation of field forms, maps, sample plot lists, and necessary measurement equipment • Strategize team tasks and plot access routes for efficient project execution • Arrange team logistics, as required: accommodation, food, and worker's safety • Ensure precise data recording and field notes, implement cross-checking procedures for data reliability, and organize post-fieldwork meetings to plan the next day's tasks Plantation Managers- • Support the team leader in task execution and conduct essential measurements and observations as required • Ensure the completeness and operational readiness of all equipment

	• Provide supervision and guidance to temporary assistants as required

Quality Assurance/ Quality control for data entry and data archiving:

The field data collected is transcribed from the manually recorded field data sheets into the data Excel spreadsheets immediately. The forester responsible therefore enters the data right after the crew comes back from the field data collection, by the inventory crew leader and another person for data quality check reasons and for time-saving reasons.

After the inventory field data has been measured and collected, a second inventory is done to ensure and test the quality of the inventory and to identify possible weak points.

Therefore 25% of all PSPs are remeasured by an inventory crew. The PSP has to be randomly chosen and should cover a point of most of the strata as per the monitoring SOP.

The long-term nature of project activities makes data archiving (maintenance and storage) an important component of a project. Copies of all data analyses and models, any GIS files, maps, and copies of all measuring and monitoring reports are stored in a dedicated and safe place.

Given the time frame over which a project may take place and the pace of production of updated versions of software and new hardware for storing data, electronic copies of data and reports are periodically updated or converted to a format that can be accessed by any future software applications. the Project activity will retain all relevant documentation till 28 February 2063 (i.e. for 2 years past the end of the project which is 28 February 2061)

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

Data / Parameter	**DBH**
Data unit	Centimeters
Description	Diameter of tree at breast height (1.37 m)
Value applied:	The value is specified in the ex-post sheet.
Comments	None

Data / Parameter	**Total CO_2e**
Data unit	Tonnes
Description	Total CO_2e sequestered by the trees
Value applied: *ov*	The value is specified in the ex-post sheet
Comments	None

Data / Parameter	Number of Tree individuals thinned
Data unit	Units
Description	The actual (Ex-post) number of tree individuals thinned will be monitored and calculated (extrapolated) per hectare with respect to the thinning year of the tree species for ex-post emission reductions calculation.
Value applied:	As calculated using the monitored field data

Comments	None

7.2 Baseline Emissions

The baseline net GHG removals by sinks is the sum of the changes in carbon stocks of the selected carbon pools within the project boundary that would have occurred in the absence of the project activity. Under the conditions of the applied methodology, changes in carbon stock of above-ground and below-ground biomass of non-tree vegetation, dead wood, litter and soil organic pools may be conservatively assumed to be zero for all strata in the baseline scenario. Additionally, the change in carbon stock biomass in trees and shrubs is zero as explained in the section-3.4.

Thus, in both the cases above carbon stock and change in carbon stock in Trees and shrubs in the baseline is accounted zero as per the Section 5 of the AR-TOOL 14 V4.2.

$$\triangle C_{BSL,t} = \triangle C_{TREE\_BSL,t} + \triangle C_{SHRUB\_BSL,t}$$

$$\triangle C_{BSL,t} = 0 + 0$$

$$\triangle C_{BSL,t} = 0$$

7.3 Project Emissions

For ex-post calculations, the project area is stratified as detailed in section 5.2. A statistically significant sample size for each stratum was determined using the winrock sample plot calculator[202]. For aboveground tree biomass calculation, the project activity continues to use the allometric equations used for ex-ante estimations. These include-

1. Tropical general (biomass) equation in absence of species-specific allometric equation for Pinus caribaea
2. Species-specific allometric equation for Eucalyptus hybrid

Applying tropical general (biomass) equation for *Pinus caribaea* in absence of species-specific allometric equation:

The tropical general (Biomass) equation used for ex-post (& ex-ante) estimation of carbon stocks in Pinus caribaea is in accordance with the guidelines of AR-TOOL 17, v1, Paragraph 6 and applicable to Uganda (or project area) being a tropical climate country[203].

In applying the aforementioned tool to the project, Section II, Appropriateness of Allometric

[202] Winrock sample plot calculator

[203] Uganda climate

Equations, was used to determine the appropriateness of the equation.

As per section II, paragraph 5 "For ex ante estimation of aboveground tree biomass in project scenario any allometric equation can be used" Whereas, the paragraph 6 identifies that "For ex-post estimation an equation is considered eligible for estimation if it meets one of the following criteria.

(a) The equation is used in the national forest inventory, or the national GHG inventory, of the host Party;

(b) The equation has been used in commercial forestry sector of the host Party for ten years or more;

***(c)** The equation was derived from a data set of at least 30 sample trees, and the value of coefficient of determination (R2) obtained was not less than 0.85.*

The tropical general (biomass) equation used for the ex-post calculation of Pinus caribaea under the project is sourced from page #43 of the "Sourcebook for Land Use, Land Use Change, and Forestry Projects (Timothy Pearson, Sarah Walker, and Sandra Brown, Winrock 2005)"[204]. Thus, the equation satisfies **criteria (c)** (above), as it was developed from a dataset[205] of more than 500 trees with a value of coefficient of determination (R2) as 0.97.

Moreover, the general equation is applied as a default equation for Pinus caribaea with a biomass expansion factor (bole to tree biomass) of 1.2 as applied by "TIST Program in Uganda, VCS-CCB 011" [Project ID: 2497] – a registered VCS CCB project[206] and "TIST Program in Kenya CCB-001"[207].

The tropical general (biomass) equation[208] being used for Pinus caribaea is as follows:

$Y = (0.2035 \times DBH^{2.3196}) \times 1.2$
Where,

Y= aboveground dry matter, kg (tree)-1 DBH = diameter at breast height, cm and 1.2 = expansion factor to go from bole biomass to tree biomass.

Applying Species-specific allometric equation for Eucalyptus hybrid:

[204] Sourcebook for land use, land-use change, and forestry projects by timothy Pearson, Sarah Walker and Sandra brown

[205] Tropical General (biomass) Equation Dataset

[206] TIST Program in Uganda, VCS-CCB 011

[207] TIST Program in Kenya CCB-001

[208] Tim Pearson, Sandra Brown and David Shoch, in "Assessment of Methods and Background for Carbon Sequestration in the TIST Project in Tanzania," Report to Clean Air Action Corporation, (December 2004)

The species of Eucalyptus being planted in the project is a Eucalyptus hybrid developed from the parent species Eucalyptus grandis (& Eucalyptus urophylla). Since, an appropriate allometric equation is not available for the Eucalyptus hybrid, taking a conservative approach; PP has applied the allometric equation of the parent species Eucalyptus grandis. This approach is conservative as the hybrid species of eucalyptus are generally known for their rapid growth and attributes, outperforming the parent species[209]. The same is evident in the comparison between DBH values achieved ex-post and the values used for ex-ante estimations, with the eucalyptus hybrid showing slightly higher value in the monitoring period (2021, 2022, and 2023)

The comparison is as follows:

Age (yrs)	Ex-ante DBH values (A)	Ex-post DBH values (B)	% difference (B) w.r.t (A)
1 year (2023)	4.72	4.74	0.5
2 years (2022)	8.00	8.15	1.9
3 years (2021)	11.81	11.88	0.6

For more details refer to VCS_4888_expost spreadsheet)

Change in carbon stock in trees between two points of time is estimated by direct estimation of change by re-measurement of sample plots.

This method is applicable only in ex-post estimation of change in the carbon stock of trees for monitoring of project activities. In accordance with the methodology, the sample plots were measured on two successive monitoring periods, and the change in biomass at the sample plot level was calculated by subtracting the initial sample plot biomass from the biomass measured during the second monitoring period.

The project plantation area was mapped using GPS for project boundaries. All project parcels are delineated and submitted as a polygon as per VCS requirements (refer to section 3.3). An inventory of trees per species planted within each plot is recorded at the time of plantation. Before the first monitoring event, a permanent sample plot was selected for the monitoring of growth parameters. The same sample plots were monitored for growth and survival at every monitoring event.

To calculate the Ex-Post change in carbon stock, the project activity applies the method found in 6.2 of AR-TOOL 14 V4.2 “Direct estimation of change by re-measurement of sample plots”. As per the methodological tool,

[209] DENSITY, CALORIFIC VALUE AND CLEAVAGE STRENGTH OF SELECTED HYBRID EUCALYPTS GROWN IN UGANDA Maderas. Ciencia y Tecnología, vol. 16, núm. 1, febrero, 2014, pp. 13-24

The actual net GHG removals by sinks are estimated using the equation 2 of the methodology AR ACM0003 (Version 02.0).

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

Where:

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year *t*; t CO_2-e

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e

$GHG_{E,t}$ = Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year *t*, as estimated in the tool "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO_2-e

Change in the carbon stocks in project, occurring in the selected carbon pools in year t is calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t} \quad \text{Equation (3)}$$

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e

$\Delta C_{TREE\_PROJ,t}$ = Change in carbon stock in tree biomass in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{SHRUB\_PROJ,t}$ = Change in carbon stock in shrub biomass in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{DW\_PROJ,t}$ = Change in carbon stock in dead wood in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO_2-e

$\Delta C_{LI\_PROJ,t}$	=	Change in carbon stock in litter in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO_2-e
$\Delta SOC_{AL,t}$	=	Change in carbon stock in SOC in project, in year *t*, in areas of land meeting the applicability conditions of the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; t CO_2-e

Use of Uncertainty Tool:

The project activity involves the use of an uncertainty tool as per the AR-TOOL14 V4.2, with the help of equation 6 i.e.

$$u_{\Delta C} = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_{\Delta,i}^2}{n_i}}}{|\Delta b_{TREE}|}$$

Equation (6)

Where:

ΔC_{TREE}	=	Change in carbon stock in trees between two successive measurements; t CO_2e
CF_{TREE}	=	Carbon fraction of tree biomass; t C (t d.m.)$^{-1}$ A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.
ΔB_{TREE}	=	Change in tree biomass within the biomass estimation strata; t d.m.
A	=	Sum of areas of the biomass estimation strata; ha
Δb_{TREE}	=	Mean change in tree biomass per hectare within the biomass estimation strata; t d.m. ha^{-1}
w_i	=	Ratio of the area of stratum *i* to the sum of areas of biomass estimation strata (i.e. $w_i = A_i/A$); dimensionless
$\Delta b_{TREE,i}$	=	Mean change in carbon stock per hectare in tree biomass in stratum *i*; t d.m. ha^{-1}
$u_{\Delta C}$	=	Uncertainty in ΔC_{TREE}
t_{VAL}	=	Two-sided Student's *t*-value for a confidence level of 90 per cent and degrees of freedom equal to $n - M$, where n is total number of sample plots within the tree biomass estimation strata, and M is the total number of tree biomass estimation strata
$s_{\Delta,i}^2$	=	Variance of mean change in tree biomass per hectare in stratum *i*; (t d.m. ha^{-1})^2
n_i	=	Number of sample plots, in stratum *i*, in which tree biomass was re-measured

Use of VCS Harvesting Guidance:

The project activity includes harvesting in the project management plan. As per the AFOLU guidance LTA scenario 4, ARR project instances with harvesting activities shall not be issued GHG credits above the long-term average GHG benefit maintained by the project activity. The time period over which the long-term GHG benefit is calculated shall include at minimum one full harvest/cutting cycle, including the last harvest/cut in the cycle. For strata with harvest, the long-term average is estimated using the following equations:

$$LA = \frac{\sum_{t=0}^{n} PE_t - BE_t}{n}$$

Where:

LA	=	The long-term average GHG benefit
PE_t	=	The total to-date GHG emission reductions and removals generated in the project scenario (tCO_2e). Project scenario emission reductions and removals shall also consider project emissions of CO_2, N_2O, CH_4 and leakage.
BE_t	=	The total to-date GHG emission reductions and removals projected for the baseline scenario (tCO_2e)
t	=	Year
n	=	Total number of years in the established time period

7.4 Leakage Emissions

The project activities do not lead to any displacement of agricultural production within the project boundary. As a consequence, leakage emissions are deemed to be zero throughout the project's lifespan.

Leakage emissions shall be estimated as follows:

$$LK_t = LK_{AGRIC,t} \qquad \text{Equation (4)}$$

Where:

LK_t	=	GHG emissions due to leakage, in year *t*; t CO_2-e
$LK_{AGRIC,t}$	=	Leakage due to the displacement of agricultural activities in year *t*, as estimated in the tool "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity"; t CO_2-e

Refer to section 5.3 for more details.

7.5 GHG Emission Reductions and Carbon Dioxide Removals

State the non-permanence risk rating (%)	21%
Has the non-permanence risk report been attached as either an appendix or a separate document?	☒ Yes ☐ No The latest NPRT report has been shared with the VVB
For ARR and IFM projects with harvesting, state, in tCO_2e the Long-term Average (LTA).	1,017,275 tCO2e
Has the LTA been updated based on monitored data, if applicable?	☒ Yes ☒ No
State, in tCO_2e, the expected total GHG benefit to date	429,924 tCO2e
If a loss occurred (including a loss event or reversal), state the amount of tCO_2e lost:	No loss event occurred during this first monitoring period

Vintage period	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage emissions (tCO_2e)	Buffer pool allocation (tCO_2e)	Reductions VCUs (tCO_2e)	Removal VCUs (tCO_2e)	Total VCU issuance (tCO_2e)
01-March-2021 to 31-December 2021	0	44,850	0	9,419	0	44,850	35,431
01-January-2022 to 31-December-2022	0	119,747	0	25,147	0	119,747	94,600
01-January-2023 to 31-December-2023	0	243,221	0	51,077	0	243,221	192,144
01-January-2024 to 31-January-2024	0	22,106		4,643		22,106	17,463
Total	0	429,924	0	90,286	0	429,924	339,638

Vintage period	Ex-ante estimated reductions/ removals	Achieved reductions/ removals	Percent difference	Explanation for the difference
01-March-2021 to 31-December 2021	45,774	44,850	-2.02%	There is a varying percent difference (-/+)between the achieved emission reductions and the Ex-ante emission reductions for respective vintage years since the achieved emissions reductions are calculated based on the monitored growth parameters whereas the Ex-ante emission reductions are simply estimated projections, made using a scientific research study.
01-January-2022 to 31-December-2022	119,248	119,747	0.42%	
01-January-2023 to 31-December-2023	242,816	243,221	0.17%	
01-January-2024 to 31-January-2024 Total	54,821	22,106	-59.68%	
Total	**462,659**	**429,924**	-7.08%	

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

Following is the list of commercially sensitive information to be excluded from the public version:

Section	Information	Justification
2.1.4	Landowners consent form	The 'Landowners consent form' contains commercially sensitive information w.r.t the project commitments such as a 40-year project participation term and carbon rights transfer – that, if disclosed, could prejudice ongoing or future negotiations. It includes information w.r.t the transfer of carbon rights for registering, generating and trading of the carbon credits, public disclosure of which may result in financial disputes.
1.8	Landownership documents	The 'Landownership documents' contain personal data (e.g. name, signature, address etc.), landholding figures, and lease terms and conditions that if disclosed, could breach

		privacy of the landowner and affect contractual negotiations and may lead to financial loss. Furthermore, public disclosure of the land holding figures contained in the documents, which are part of project's financial plans and/or carbon credits estimations may result in financial disputes and affect the project implementation.
3.5.2	Landowner project registration agreement	The 'Landowner project registration agreement' includes the use of legally binding terms on carbon rights transfer, credit trading, and project participation. Public disclosure of the same may prejudice future contractual negotiations and result in financial disputes. Moreover, the agreement contains internal operational protocols, such as audit consent and restrictions on chemical fertilizer application, which are proprietary. Furthermore, it contains personal and legal information (names, addresses, signatures etc.) that may breach the privacy of landowners.
1.12	VCS_4888_Risk Mitigation SOP	The 'Risk Mitigation SOP' document contains the identified project-specific risks and mitigation measures, which, if disclosed publically, may expose project vulnerabilities and prejudice future financial negotiations and affect the implementation of the project activity.
1.4.2	VCS_4888_Project Management Plan	The 'Project Management Plan' includes sensitive information w.r.t the project internal strategies, timelines, resource allocation, and operational roles and responsibilities. Public disclosure of the same may affect the project implementation and reveal proprietary (as it includes operational planning) management approaches which may influence financial negotiations by exposing management gaps or risks in the future.
2.3.5	Carbon-benefit sharing plan	The carbon-benefit sharing plan is a sensitive document as it contains terms and conditions w.r.t the distribution of carbon-revenue as a part of internal project financial plan. Public disclosure of the same may affect the contractual negotiations with the landowners along with disputes, renegotiation demands, or stakeholder dissatisfaction. Competitors may use the information to attract the stakeholders with better terms.
1.18.2	Worker payment records	The 'workers payment records' (e.g. bank statements, payment receipts, invoices, payment logbooks etc.) contains financial and personal data of the workers and the landowner, disclosure of which may lead to privacy violations. It also shows project operational costs and payments given to the workers by respective landowner which if disclosed publically may result in disputes amongst the workers w.r.t to difference in wages. The disputes may

		hinder the project progress or implementation.