OYU- REFORESTING UGANDA FOR A BETTER TOMORROW

Document 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 Afforestation, Reforestation and Revegetation (ARR) category of Agriculture, Forestry, and Other Land Used (AFOLU) projects. This project was initiated by OYU Green with the aim of increasing green cover across 10,000 Hectares of land lying with the private landowners due to certain barriers. The primary stakeholders, which consist of farmers/ landowners, are onboarded into this project through the informed consent.

The land use existing prior to the project scenario can be broadly categorized into two categories:

a.) Low productive grasslands
b.) Unproductive and/or uncultivated croplands

The project aims to improve the Community Resilience against the negative impacts of climate change by enhancing their capacity and adapting the agroforestry systems that improves their well-being and supports the local environment. The tree species used for plantation are popular among the local community and they have been naturalized within local ecosystem over the time[1]. The tree species can be broadly categorized into two categories- Timber tree species and Horticulture tree species.

The project provides a sustainable source of timber through selective harvesting of Timber tree species i.e. *Eucalyptus grandis* and *Pinus caribaea var. hondurensis* with a unique ability to sequester carbon even after selective harvesting. Importantly, these tree species possess a distinctive capability to sequester carbon even post-harvest, ensuring the ongoing process of carbon sequestration. This characteristic makes the project an effective and enduring solution in the efforts to address climate change.

The cultivation of Horticulture tree species such as *Coffea robusta*, *Coffea arabica*, *Theobroma cacao* (cocoa), and *Macadamia sp.* yields early seeds that has significant commercial value in the market. This contributes significantly to sustainable livelihoods and income for farmers in Uganda.
Being a grouped project, there are several instances that are taking place in phased wise manner across Uganda. The project activity i.e., Revegetation, will help to sequester the ambient Carbon Dioxide into the long-lived pool (mainly Above Ground Biomass and Below Ground Biomass) that

[1] https://www.jstor.org/stable/2845655?origin=JST]R-pdf

leads to the Green House Gas emission removal. The project instance estimates the total GHG emission removals of 35,03,852 tCO2e during its project lifetime (i.e., 2021 to 2041).

1.2 Sectoral Scope and Project Type

The project has been developed under VCS sectoral scope 14 (Agriculture, Forestry and Other Land Use) and is categorized as the VCS AFOLU category ARR: Afforestation, Reforestation and Revegetation. This project is a grouped project.

1.3 Project Eligibility

The project has met the eligibility criteria of ARR, under AFOLU project categories as mentioned in the APPENDIX 1 of the VCS standard v4.5[2].

This project is seeking registration under the Verified Carbon Standard v4.5 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 the section of the section 2.1 of VCS project standard v4.5. 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 this document. 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 laws 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, and the validation deadline	The project activity "OYU- Reforesting Uganda for a Better Tomorrow" successfully satisfies all the prerequisites concerning the pipeline listing deadline according to the section 3.8.2 of VCS Standard version 4.5, the initial meeting with the validation/verification body, and the validation deadline.
3.	Demonstrate that the applied methodology is eligible under the VCS Program. Where applying a	The project utilizes the AR-ACM0003 methodology approved by the VCS program. This project is categorized as a grouped project. The

[2] https://verra.org/wp-content/uploads/2023/08/VCS-Standard-v4.5.pdf

	methodology with scale and/or 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 is structured so that none of the groups exceed the prescribed size limits. 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 v4.5)	The project is designed in such a way that the project and its activities will not lead to the violation of any applicable law, regardless of whether or not the law is enforced.
5.	The seven Kyoto Protocol greenhouse gases	The primary source of emission removal 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 4.5, following the guidelines of the Kyoto Protocol.
6.	Ozone-depleting substances (ODS)	Not applicable
7.	Project activities supported by a methodology approved under the VCS Program through the methodology development and review process.	Not applicable
8.	Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra website for exclusions).	The project employs Methodology AR-ACM0003: "Afforestation and Reforestation of Lands (excluding wetlands) Version 2.0." This methodology has received approval under the 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	Not applicable.

	Jurisdictional and Nested REDD+ (JNR) Requirements.	

AFLOU 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 establishing *timber tree species and horticulture tree species* plantations on selected low productive grassland and unproductive and/or uncultivated croplands. These plantations will result in the sequestration of significant amounts of ambient CO_2 over the project lifetime and will also help in increasing the vegetative cover.
2.	Eligible ARR projects may include timber harvesting in their management plan.	The project activity includes harvesting and replanting of timber tree species as part of the project management plan. The sustainable selective harvesting of *Eucalyptus grandis* will be done at an interval of 10 years whereas, for *Pinus caribaea var. hondurensis* it will be done at an interval of 20 years. The harvesting will be followed by replanting in subsequent years.
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 v4.5.	Based on the examination of historical satellite images of the project site locations, it was determined that none of these sites selected for the project activity had any existing forest or vegetation cover. As a result, there was no disruption or clearance of native ecosystems within 10- years period prior to the project start date

1.4 Project Design

☐ The project includes a single location or installation only

☐ The project includes multiple locations or project activity instances, but is not being developed as a grouped project

☒ The project is a grouped project

Eligibility Criteria

As per the section 3.6.17 of VCS project standard v4.5, Eligibility criteria for the new grouped project are discussed below. New project activity instances shall:

Eligibility Criteria	Justification/Description
Occur within one of the designated geographic areas specified in the project description.	The upcoming project instances will be situated within the geographic regions of Uganda, located in East Africa. Each of these areas falls within the project boundaries and shares 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 instances will meet the requirements outlined in predefined sets of criteria established for eligibility. It will satisfy all the specified conditions and guidelines within that particular set of criteria to be considered eligible for inclusion in the 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 validation/verification body.	The applicable set of eligibility criteria is mentioned in the relevant section and will follow the same approach for new 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 removing GHG emissions)	The Project Proponent holds legal documents as evidence of ownership for each project activity instance, with the corresponding start date signifying when the project instance commenced its efforts to remove or eliminate greenhouse gas emissions.
Have a start date that is the same as or later than the grouped project start date	The project start date aligns with the grouped project start date, and it corresponds to the initiation of soil preparation for plantation. This commencement date is consistent with

	the specifications outlined in section 3.8 of the project standard, version 4.5.
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, 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 is not concurrently participating in any other VCS project.
Adhere to the clustering and capacity limit requirements for multiple project activity instances set out in 3.6.8 - 3.6.9.	The project complies with the clustering and capacity limit requirements for multiple project activity instances, as detailed in sections 3.6.8 to 3.6.9, it aligns with the established guidelines and standards.

1.5 Project Proponent

Organization name	OYU Green Private Limited
Contact person	Mr. Srajan Gupta
Title	VP – Project Origination
Address	Plot C1, Govindpura Industrial Area, Bhopal - 462016
Telephone	+91 97558 84444
Email	srajan.gupta@shrimaagroup.in

1.6 Other Entities Involved in the Project

Organization name	Shri Maa Marketing Pvt. Ltd.
Role in the project	Project Operator
Contact person	Mr. Deep Gupta
Title	V.P. Global Expansion

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

1.7 Ownership

The Project Proponent is OYU Green Private Limited. The plantations have explicitly taken place on privately owned lands and the landowners have agreed to transfer the allocated carbon credits to the Project Proponent and the other entities involved, by the terms & conditions of the agreement.

The evidence of the project ownership i.e., the MOU, agreement documents, and land ownership documents are available with the Project Proponent and may be furnished before the Validation/Verification Body with a prior request.

1.8 Project Start Date

The project's start date is March 1, 2021. In accordance with VCS Project requirements, the project start date for an AFOLU (Agriculture, Forestry, and Other Land Use) project is determined as the date on which activities that result in the generation of reductions or removals commence. This corresponds to the initiation of land preparation by landowners for the implementation of agroforestry practices.

1.9 Project Crediting Period

The project's crediting period is 20 years with crediting period start date as March 1, 2021 and end date is February 28, 2041.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The estimated annual GHG emission reductions/removals of the project are:

☐ <20,000 tCO_2e/year

☐ 20,000 – 100,000 tCO_2e/year

☒ 100,001 – 1,000,000 tCO_2e/year

☐ >1,000,000 tCO_2e/year

Project Scale

Project	[X]
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
01-March-2021 to 28-Feb-2022	-
01-March-2022 to 28-Feb-2023	40,608
01-March-2023 to 28-Feb-2024	1,41,018
01-March-2024 to 28-Feb-2025	2,71,642
01-March-2025 to 28-Feb-2026	3,97,882
01-March-2026 to 28-Feb-2027	2,44,318
01-March-2027 to 28-Feb-2028	6,66,136
01-March-2028 to 28-Feb-2029	2,36,042
01-March-2029 to 28-Feb-2030	2,39,083
01-March-2030 to 28-Feb-2031	2,79,919
01-March-2031 to 28-Feb-2032	3,22,582
01-March-2032 to 28-Feb-2033	3,66,895
01-March-2033 to 28-Feb-2034	2,31,444
01-March-2034 to 28-Feb-2035	10,200
01-March-2035 to 28-Feb-2036	9,896
01-March-2036 to 28-Feb-2037	9,636

01-March-2037 to 28-Feb-2038	9,410
01-March-2038 to 28-Feb-2039	9,214
01-March-2039 to 28-Feb-2040	9,041
01-March-2040 to 29-Feb-2041	8,887
Total estimated ERs	35,03,852
Total number of crediting years	20
Average annual ERs	175,193

1.11 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.

In Western Uganda, the Rwenzori Mountains, commonly known as the Mountains of the Moon, run along approximately eighty kilometers of the border shared with the Democratic Republic of Congo (DRC). In Eastern Uganda, the border with Kenya is delineated by the volcanic Mt. Elgon, which stands at 4,324 meters above sea level (ASL).

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. Uganda covers 241,040 square kms of land. Arable land comprises 27.4%, and 11.2% is in permanent crops; only 0.1% of cropland is irrigated (World Bank 2009a)[3].

Project Objectives:

The project is not located within a jurisdiction covered by a jurisdictional REDD+ program.
The primary goal of the grouped project is to make sustainable utilization of low productive grasslands and unproductive and/or uncultivated croplands for plantations of agroforestry tree species. The Project Proponent, in collaboration with local implementation partners, has provided support to these farmers by organizing training programs with local stakeholder consultation aimed at enhancing their skills and capacity in agroforestry plantation activities.

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

The Project Proponent, in collaboration with local implementation partners, will organize workshops aimed at raising awareness about the carbon finance-based agroforestry project. A key focus of the project will be capacity-building through these workshops, with the aim of mobilizing and training farmers in effective plantation methods. The Project Proponent will play a vital role in educating farmers about the environmental and socio-economic advantages associated with agroforestry plantations.

The initial species selected for plantation include *Eucalyptus grandis*, *Pinus caribaea* var. *hondurensis*, *Theobroma cacao, Coffea arabica, Coffea robusta, and Macadamia sp.* These tree species were chosen for their significant potential in capturing carbon, aligning with the project's overarching goals.

Project Activities:

Capacity building:

Capacity building and training are integral part of project activities, encompassing the education of landowners in planting material, cultivation, management, and skill development. The project actively provides awareness of sustainable planting and management practices through these initiatives.

Trainings and workshops:

Conducting workshops on planting activity, post planting management and monitoring, focusing on field measurements of parameters essential for Greenhouse Gas (GHG) accounting and carbon stock assessment. Organizing awareness program on 'Hazard Identification and Risk Assessment (HIRA)' including fire prevention and mitigation measures.

Communities/stakeholders involved in the project:

The key stakeholders in the project are the landowners residing within the project boundary in Uganda. As active participants, these landowners are also the primary recipients of the project's benefits.

Enhancement of ecosystem services:

The Project Proponent has chosen plantation lands that has undergone no ecosystem changes, meeting all eligibility criteria of the VCS Standard The ecosystem services derived from the project activity include the improvement of the soil nutrient cycle, biodiversity conservation also involved in GHG emission reductions or carbon dioxide removals.

1.12 Project Location

The project is located in Uganda. The individual project areas, their location and their boundaries will be provided separately in the form of KML files. The geo-coordinates for Uganda are:

- Latitude: 1°22' 24.00'' N
- Longitude: 32°17' 24.99'' E

This information can be verified at the following link: https://www.mappr.co/location/uganda/

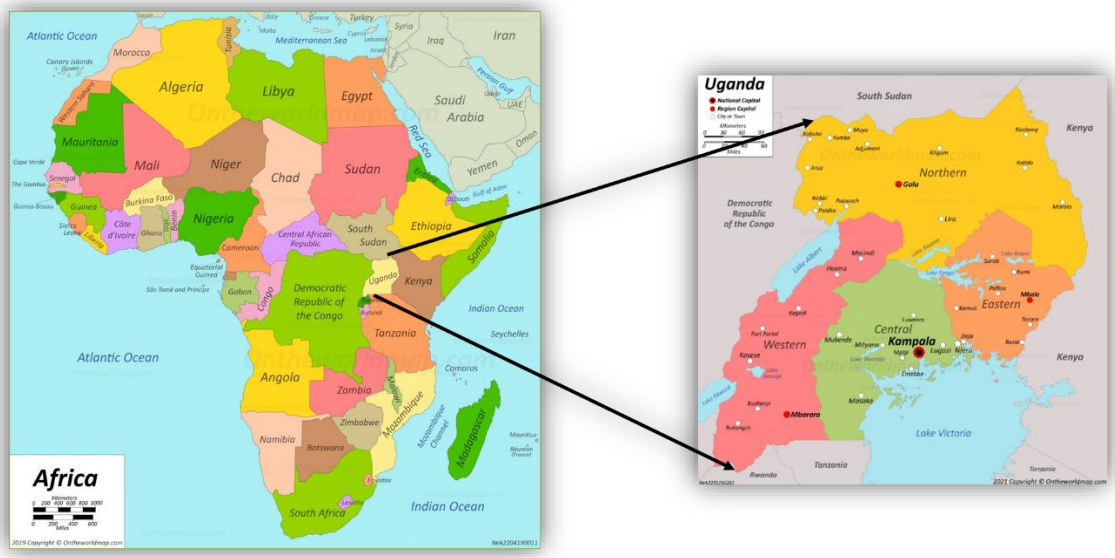


Figure 1: Map of Africa showing Uganda

(Source- https://ontheworldmap.com/uganda/)

1.13 Conditions Prior to Project Initiation

The pre-project conditions involved low productive grassland and unproductive and/or uncultivated croplands. The project has implemented sustainable agroforestry systems, benefiting local farmers and other stakeholders by providing a sustainable source of income while simultaneously contributing to the removal of GHG emissions. There has been no alteration or transformation of the natural ecosystem in the past ten years from the date of project initiation.

- **Ecosystem type:** Uganda's diverse forested areas encompass both natural forests and planted forests, which predominantly consist of pine and hardwood plantations. Forest coverage statistics may vary depending on the source. As reported by the government, forests extend over approximately 4.9 million hectares, equivalent to 24% of the country's total land area. These forests are further categorized into tropical high forests, covering 924,208 hectares, woodlands spanning 3,974,102 hectares, and plantations, which occupy 35,066 hectares (according to GOU data from 2007).

  Within the total forested expanse, around 30% of the land, or 1.9 million hectares (9% of Uganda's land area), is designated as protected territory, which includes Central and Local Forest Reserves, National Parks, and Wildlife Reserves. The remaining 70% of the forested land is situated on private property. Of note, there are 506 Central Forest

Reserves, collectively encompassing 1,265,742 hectares, serving various purposes and uses as outlined in government regulations and policies[4].

- **Current and historical land-use:** Uganda's land use is shaped by rainfall, influenced by factors like elevation and local geography. The country experiences both bimodal and unimodal rainfall patterns, with variable rainfall between 1000–1500 mm annually. Rainfall is evenly distributed, except in the northeastern corner. Rapid population growth, from 9.5 million in 1969 to 34.6 million in 2014, coupled with environmental degradation, poses a significant challenge to land resource sustainability.

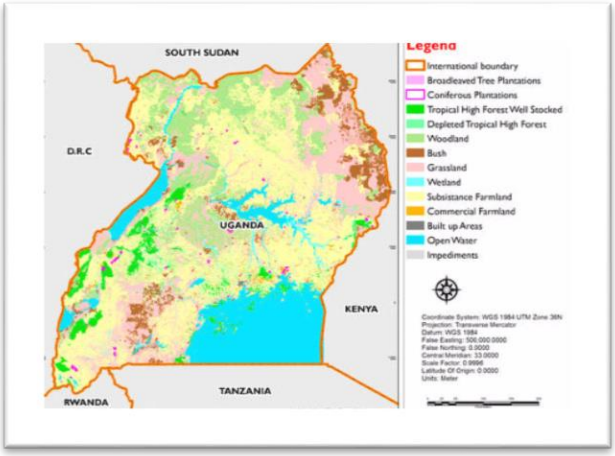


Figure 2: Land use/cover for Uganda for the year 1990 (Source-MDPI)[5]

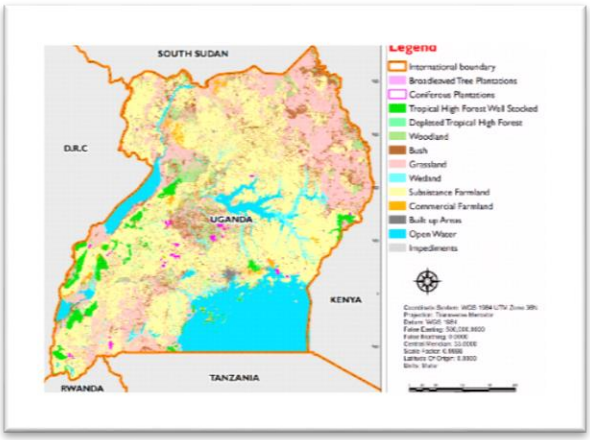


Figure 3: Land use/cover for Uganda for the year 2015 (Source- MDPI)[6]

[4] https://www.land-links.org/country-profile/uganda/#1528834180716-4b3ed73d-8a60

[5] https://www.mdpi.com/2073-445X/7/4/132

[6] https://www.mdpi.com/2073-445X/7/4/132

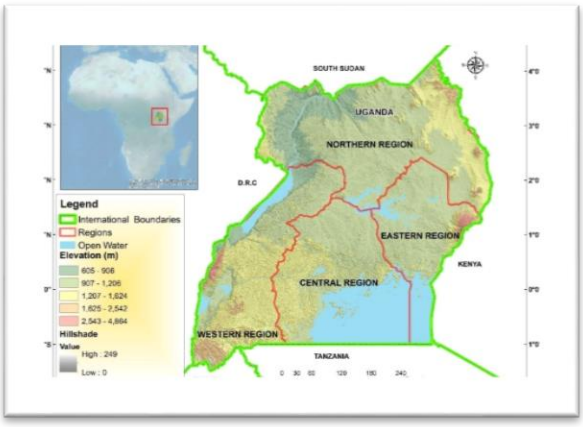


Figure 4: Map of the study area showing project location (Eastern and Western regions of Uganda) Source- Research gate[7]

- Climate projections for Uganda from 1981 to 2019[8]-
  - Very high rainfall in the northern region.
  - Moderate rainfall in the northern central and eastern regions.
  - Very low rainfall in the south-western and central regions.

1) In terms of solar radiation:

- Very high in the north-eastern and south-eastern regions.
- Moderate in the central and north-western regions.

2) Relative humidity varies:

- Very high in the western, central, and eastern regions.
- Very low in parts of the north-western and northern Uganda.

These climatic conditions reflect a diverse landscape with varying levels of rainfall, solar radiation, and humidity across different regions of Uganda.

[7] https://www.researchgate.net/publication/359850613_Review_of_the_Past_Current_and_the_Future_Trend_of_the_Climate_Change_and_its_Impact_in_Uganda

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

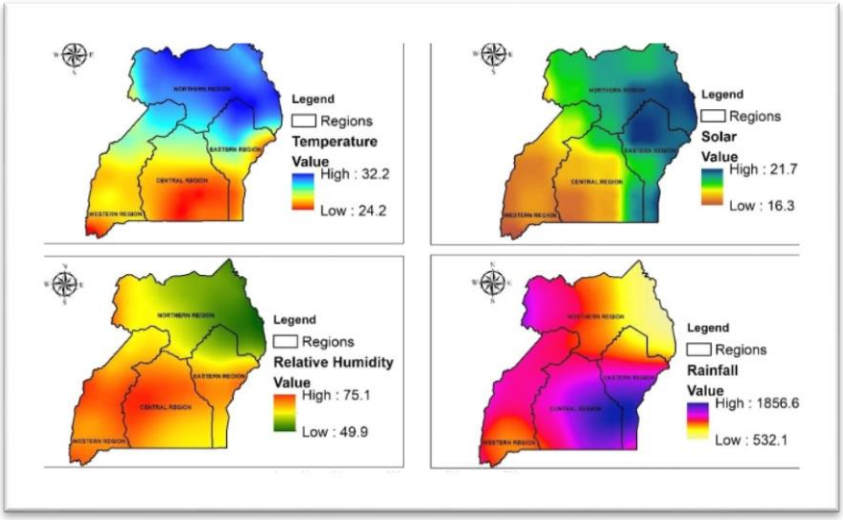


Figure 5: Climate projections for Uganda from 1981 to 2019

- Topography and soil structure- Uganda's topography is diverse and includes a plateau that rises gradually from Lake Victoria's shores to the Rwenzori Mountains in the west. The plateau features hills, valleys, and low-lying areas. The country also has other mountain ranges like the Virunga Mountains in the southwest and Mount Elgon in the east. Uganda is home to several lakes, with Lake Victoria being the largest in Africa and the second-largest globally. This topography significantly influences the country's climate, water resources, biodiversity, and agriculture[9].

  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. Conservation efforts aim to mitigate soil erosion and sustain agricultural fertility.

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

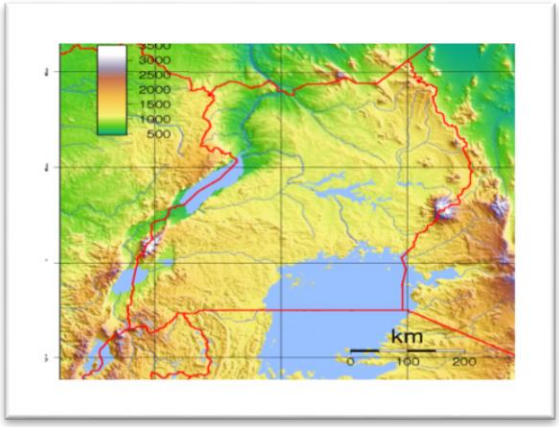


Figure 6: Topography of Uganda

- Climatic conditions and temperature- 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 zones, and the topography, prevailing winds, and lakes and rivers cause large differences in rainfall patterns across the country. 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, total annual average precipitation is 1,197 mm, and mean monthly precipitation of the country varies from 39.6 mm in January to 152.7 mm in April[10].

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

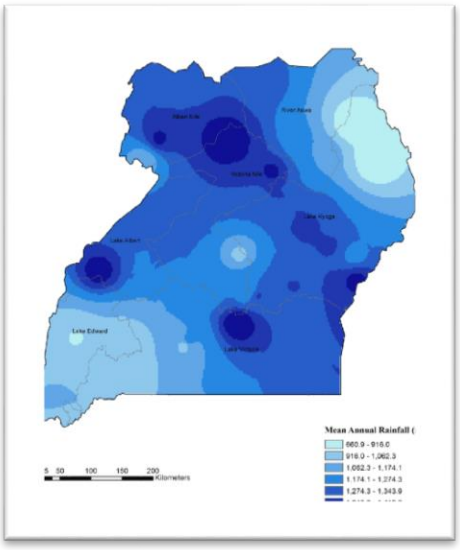


Figure 7: Mean annual rainfall in sub- basins of Uganda (1940-2009)[11]

The project activity is Revegetation of land with timber tree species and horticulture tree species plantations which 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).

- **Has the land been cleared of native ecosystems within 10 years of the project start date?**

  ☐ Yes ☒ No

1.14 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 her commitment to the UNFCCC, the Kyoto Protocol and to the Paris Agreement. The Project complies with this regulatory framework, because in the AFOLU scope, Revegetation is one of mechanisms by which GHG emissions are expected to be removed.

[11] https://www.researchgate.net/figure/Distribution-of-Mean-annual-rainfall-in-main-drainage-sub-basins-in-Uganda-1940-2009_fig2_269393925

Table: 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[12]	The act aims to sustainable increase in economic social and environmental benefits from forests and tress by all people of Uganda. It promotes improvement and livelihoods through strategies and actions that contribute to the poverty eradication also encourages public participation in management and conservation of forests and trees. .	The National Forestry and Tree Planting Act doesn't limit the project's goals. The project activity generates economic benefits through plantation of timber tree species and horticulture tree species, promotes social welfare through public participation of local stakeholders and farmers in tree planting for sustainable income and social impact, and contributes to environmental well-being by reducing greenhouse gas emissions.
Land Act, Cap 227[13]	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 both private lands and local community lands. The landowners have willingly consented to transfer the allocated carbon credits to the Project Proponent and other relevant entities. As a result, the project activity remains compliant with this specific legal requirement.
National Environment Act, 1995, Cap 153[14]	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.

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

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

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

Land Acquisition Act 1965, Cap 226[15]	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 local landowners and communities hence the restrictions under this Act does not prohibit the activities under these scenarios.
Uganda Wildlife Act, 1996 Cap 2000[16]	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 timber tree species and horticulture tree species on low productive grassland and unproductive and/or uncultivated croplands, 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[17]	The legislation empowers Parliament to create laws for environmental protection and management. It lacks language specifically impacting the project.	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

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been registered under any other GHG programs and is not seeking registration under any other GHG programs.

1.15.2 Projects Rejected by Other GHG Programs

The project has not participated in any other programs and has therefore not been rejected by any of them.

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

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

[17] 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

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

Does the project reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading?

☐ Yes ☒ No

1.16.2 Other Forms of Environmental Credit

Has the project sought or received another form of GHG-related credit, including renewable energy certificates?

☐ Yes ☒ No

1.16.3 Supply Chain (Scope 3) Emissions

Negligible as nurseries were close to the project area and there were no goods that were transported during the implementation of the project

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

The Project activity will contribute to the following indicators for sustainable development – Social well-being, Economic well-being, Technological well-being, and Environmental well-being.

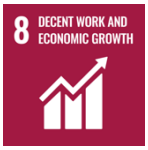
- **Socio-economic well-being:** Income, education, and occupation are the top three consistent measures used for measuring the status of socio-economic well-being[18]. The project aims to benefit the primary stakeholders by generating additional sources of income through the activities involved in the project and by creating employment opportunities. The project activity will try to remove social disparities if practiced by the natives by encouraging participation among all members of society regardless of income, religion, or gender.

- **Technological well-being:** The project activities will provide the transfer of environmentally safe and sound technologies, including the use of smartphones, laptop/computers, GPS devices, and the Internet.

- **Environmental well-being:** The project establishes plantation of timber tree species and horticulture tree species to provide a variety of ecosystem services, mainly timber and non-timber forest products. In addition to such services, the plantation will provide direct and indirect benefits to biodiversity via the provision of forest habitat for a wide range of species,

[18] TheEffectofSocioeconomicStatusonWell-Being.pdf

and by reducing negative impacts on natural forests by offsetting the need to extract resources

SDG	How the SDG is covered
	The project seeks to involve local communities, particularly farmers, in the plantation of timber and horticulture tree species. This initiative establishes a dependable and sustainable income source derived from timber and fruit, specifically seeds of horticulture tree species integrated into the project. Additionally, it contributes to sustainable extraction practices, thereby alleviating poverty and enhancing livelihoods.
	The project's primary objective is to create an additional income source for farmers through their involvement in tree-planting-related activities. This endeavour is expected to uplift the income of local residents, including men, women, and young individuals, by generating employment opportunities. The project will provide skilled local workers with opportunities to supplement their income through project activities, expand tree planting initiatives, facilitate the sale of essential inputs, and make substantial contributions to the local economy, leading to multiplier effects and eventual economic growth.
	The project activity is strategically designed to have a positive and meaningful environmental impact by effectively sequestering significant amounts of carbon dioxide. Plantation of timber tree species and horticulture tree species known for their high carbon sequestration capabilities, the project aligns itself with the objectives of Sustainable Development Goal (SDG) 13, which focuses on "Climate Action."
	Trees play a crucial role in advancing Sustainable Development Goal 15, focused on 'Life on Land.' They help prevent soil erosion by anchoring the topsoil and support the growth and preservation of vegetation. The adoption of best practices, such as agroforestry, enhances land management and fortifies the plantation's resilience to climate change impacts. Furthermore, the presence of trees provides food and shelter for various species, thereby increasing biodiversity in the area. Ultimately, this concerted effort assists in mitigating climate change through the reduction of greenhouse gas emissions.

1.17.2 Sustainable Development Contributions Activity Monitoring

The project contributes towards multiple Sustainable Development Goals (SDGs), including SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), SDG 13 (Climate Action) and SDG 15 (Life on Land).

Project's quantifiable contributions to specific targets and indicators of the Sustainable Development Goals (SDGs) for the monitoring period is given below-

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	1.2	1.2.2 Proportion of men, women, and children of all ages living in poverty in all its dimensions according to national definitions	Implemented activities to decrease	• Generated employment and asset creation for local communities comprising men, women, and children. • Increased employment in the project area through various activities	The project activity is expected to involve the maximum number of workers possible and those who are willing to be part of this project and increase the gross value of production per unit area of land by six to eightfold. The project has provided economic benefits to many people by employing them in the project implementation activities (field survey, monitoring activity, stakeholder's meetings).

2)	8.2	8.2.1 Annual growth rate of real GDP per employed person	Implemented activities to increase	The project's main goal was to boost local income by involving farmers in tree-planting, creating employment for residents, including men, women, and youth. It offers income opportunities, expands tree planting, sells agricultural inputs, boosts the local economy, and triggers economic growth.	The project targets to improve the livelihood conditions of the temporary and full time employed workers and increase their real GDP by significant margins.
3)	13.0	Tones of greenhouse gas emissions avoided or removed	Implemented activities to increase	Raised plantations in 10,000 hectares of land has prevented the release of significant carbon into the atmosphere.	The project activity is expected to achieve an emission removal of 3.5 million tCO2e over the 20 years crediting period.
4)	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, by revegetating more than 10,000 hectares of land area since 2021.	The project activity instance aimed at increasing the green cover by revegetating 10,000 hectares over the project lifetime.

1.18 Additional Information Relevant to the Project

Leakage Management

As per VCS Standard v4.5, the projects are encouraged to include leakage management zones as part of the overall project design. Leakage management zones are part of a leakage management plan, they can minimize the displacement of land use activities to areas outside the project area by maintaining the production of goods and services, such as agricultural products, within areas under the control of the Project Proponent or by addressing the socio-economic factors that drive land use change. As per section 3.15.15 of VCS Standard v4.5, the projects will monitor and calculate leakage, by the applied methodology, for all ex-post accounting (i.e., at each verification), and leakage shall be deducted from the GHG emission reductions and/or carbon dioxide removals of the project. Any leakage shall be subtracted from the number of reductions and removals eligible to be issued as VCUs.

The project's overall leakage has been deemed negligible, as the displacement of agricultural activities can be considered insignificant

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

2.1 No Net Harm

No potential negative environmental or socio-economic impact have been identified for the project. Instead, this project will have a net positive effect on the landowners and their farmland selected through the initial screening. The project has been designed to improve the overall the environmental services and socio-economic values. This is held in high regard in every phase of the project development from design to implementation to monitoring. The project also improves the economic conditions of the landowners over the project period and beyond that period as well.

Because of all the reasons mentioned above, this project is deemed to produce positive impacts only.

2.2 Local Stakeholder Consultation

The Project Proponent is committed to engaging with all stakeholders, to ensure that their views are heard and prioritized. The stakeholder identification process is integrated into the Project Proponent's land access procedure, and consultation is performed before the signing of agreement to understand and resolve any potential concerns or issues ahead of the implementation.

Stakeholder Engagement Process –

Stakeholders are divided into two categories-

1. Primary Stakeholders- Farmers/Landowners

2. Secondary Stakeholders- Community members, public representatives and other experts.

The Project Proponent is engaged with stakeholders during project design and implementation. The Project Proponent is taking all measures to communicate and consult with the stakeholders in an ongoing process for the longevity of the project, as stated in the points of section 3.18 of the VCS Standard v4.5

The primary and secondary stakeholders is benefited from the ecosystem services as a result of project activities both directly and indirectly which will enhance their well-being.

The location of the stakeholders is the lands owned by the landowners and its adjacent areas situated within the territory of Uganda where plantations are raised as the multiple project instances and where the stakeholders will be impacted directly or indirectly due to the project activities.

Outcomes of the local stakeholder consultation determines the stakeholder consent for project design and implementation, considering associated risks, costs, and benefits. Compliance with Uganda's laws and regulations safeguarding workers' rights are prioritized. The project is undergoing the Verified Carbon Standard (VCS) validation and verification process, ensuring credibility in carbon reduction claims and adherence to established standards.

As per section 3.18.4 of the VCS Standard v4.5, the Project Proponent has developed a grievance redress procedure to address disputes with stakeholders that may arise during project planning and implementation, including benefit sharing and all other safeguard and stakeholder engagement requirements mentioned in Sections 3.18 and 3.19 respectively. The procedure includes the processes for receiving, hearing, responding, and attempting to resolve grievances within a reasonable period, taking into account culturally appropriate conflict resolution methods. The procedure and documentation of disputes resolved through the procedure shall be made publicly available. The procedure shall have three stages:

1. The Project Proponent shall attempt to amicably resolve all grievances and provide a written response in a manner that is culturally appropriate.

2. Any grievances that are not resolved by amicable negotiations shall be referred to mediation by a neutral third party.

3. Any grievances that are not resolved through mediation shall be referred either to arbitration, to the extent allowed by the laws of the relevant jurisdiction or competent courts in the relevant

jurisdiction, without prejudice to a party's ability to submit the grievance to a competent supranational adjudicatory body, if any.

The Project Proponent has taken care of all the inputs received during the consultation and the project has been designed and implemented after the consultation process and the inputs received from the stakeholders.

Any updates to the project design and its implementation will be added further in the future.

For AFOLU projects, also demonstrate how the project has or will communicate the following:
The risks, costs and benefits the project may bring to local stakeholders-

Stakeholders encounter minimal risks to their working conditions, highlighting the Project Proponent's unwavering dedication to upholding a secure and favorable work environment throughout the project. The initiative not only ensures the well-being of stakeholders but also delivers advantages through the generation of sustainable income, further supported by carbon financing.

All relevant laws and regulations covering workers' rights in the host country-

The project actively acknowledges, respects, and promotes the rights of Indigenous Peoples (IPs), Local Councils (LCs), and customary rights holders in accordance with relevant international human rights laws, including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and ILO Convention 169. This commitment ensures the protection of their rights throughout the project's implementation.

The process of VCS Program validation and verification and the validation/verification body's site visit-

The validation and verification process under the VCS Program will be conducted during the initial monitoring phase.

Furthermore, the Project Proponent also conveyed the required explanations on various aspects of the project. These are as follows:

1. *How is the project communicating its design and implementation, including the results of monitoring?*
   The project design and implementation is communicated with the stakeholders by actively involving them in the project activities. Moreover, regular inputs and/or feedbacks of the stakeholders on project design and implementation activities were taken at the time of Local Stakeholder Consultation and all other meetings such as personal meetings with individual stakeholder, telephonic communications etc.

   The Project Proponent will share the results of monitoring by means of the aforesaid channels of communication as well as by organizing a specific local stakeholders meeting post completion of validation and verification of the project. The sole purpose of this meeting will be to make stakeholders aware about the progress of the project including, the results of respective monitoring incidence.

2. *How is the project communicating the risks, costs and benefits it may bring to local stakeholders?*

No major risks were determined at the time of the local stakeholders' consultation meet. Moreover, the Project Proponent shared the approximate cost to be incurred for the project activities along with numerous benefits (both monetary and non-monetary) brought about by the proposed project during the meeting sessions.

3. *How is the project communicating all relevant laws and regulations covering workers' rights in the host country?*

   During local stakeholders' consultation meet, all the latest laws and regulations pertaining to labours' or workers' rights in the country were conveyed to the project participants (e.g., stakeholders, labourers / workers etc.) by the Project Proponent.

4. How is the project communicating the process of VCS Program validation and verification and the validation/verification body's site visit?

   At the local stakeholders' meet, the Project Proponent has thoroughly explained the entire process of VCS program validation and verification as per the procedural guidelines mentioned in the VCS standard document version 4.5.

The Project Proponent also conveyed information on sharing a detailed schedule plan (including dates and time) pertaining to the validation/verification body's (VVB) site visit with the respective stakeholders in advance for ease in the verification process. The stakeholders were also assured to have an opportunity for independently interacting with the VVB without direct involvement of OYU Green personnel at the time of validation/verification event.

2.3 Environmental Impact

This project does not have any kind of negative environmental impact, instead it aims to improve the overall microclimate of the project area. The project focuses on environmentally sustainable cultivation of Timber and horticulture tree species, ensuring responsible planting, cultivation, and harvest practices to minimize environmental impact.

2.4 Public Comments

This section will be completed after the 30-day public comment period.

2.5 AFOLU-Specific Safeguards

No discernible risks to stakeholders and their resources have been identified as a result of implementing the project activity, as outlined in the table below.

	Risks identified	Mitigation or preventative measure taken
Risks to stakeholder participation	No risk identified	The project anticipates no natural or human-induced risks to stakeholders' well-being throughout its duration, given that no yields existed prior to project activities. All activities are conducted on low productive land within private property, minimizing potential impacts on stakeholders.
Working conditions	No risk identified	Stakeholders face no risks to their working conditions, underscoring the commitment to maintaining a safe and conducive work environment by the Project Proponent.
Safety of women and girls	No risk identified	Project activities are exclusively conducted on remote private land, with access restricted to individuals affiliated with the project for safety considerations, particularly for women and girls. Various measures, including the strong enforcement of workplace policies, have been taken to create a safe and harassment-free environment for them.
Safety of minority and marginalized groups, including children	No risk identified	All measures have been taken to ensure the safety of minority and marginalized groups, including children, through the implementation and enforcement of anti-

		discrimination policies, as well as providing equal employment opportunities.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	No risk identified	The project focuses on environmentally sustainable cultivation of timber and horticulture tree species, ensuring responsible planting, cultivation, and harvest practices to minimize environmental impact.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The CDM consolidated methodology AR-ACM0003: Afforestation and reforestation of lands except wetlands -Version 02.0 is applied. In addition, the following tools are applied by the project: Joint Project Description & Monitoring Report: VCS Version 4.2 21 - Combined tool to identify the baseline scenario and demonstrate additionally in A/R CDM project activities (Version 01) - Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2)

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
AR-ACM0003	(a) The land subject to the project activity does not fall in wetland category	According to the IPCC GPG LULUCF 2003, wetlands are areas intermittently or continuously saturated by water, such as peatlands. They are distinct from forest land, crop land, grassland, or settlements, encompassing reservoirs, natural rivers, and lakes.

		The lands to be included within the project area, according to the information provided in the pre project stage, are low productive grasslands since many years and unproductive and/or uncultivated croplands, none of them categorized as wetlands.
...	(b) Soil disturbance attributable to the project activity does not cover more than 10 per cent of 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	(i) According to the definition of Organic Soils of the Glossary, Annex A, IPCC Good Practice Guidance to LULUCF[19] (Thickness of >10 cm, A horizon have 12 percent or more organic carbon when mixed to a depth of 20 cm and 35 percent organic matter), land soils intended for the project do not fit into the category. Predominant soils in Uganda primarily consist of Acric Ferralsols, characterized by low carbon content and pH levels. The mean organic carbon content observed in the project area is notably low, approximately around 2%[20]. The baseline involved the utilization of low-productive grasslands and unproductive and/or uncultivated croplands. These areas are

[19] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Glossary_Acronyms_BasicInfo/Glossary.pdf

[20] https://agritrop.cirad.fr/576797/1/GACHIMBI-2004-soil%20fertility%20eastern%20Uganda.pdf

		treated using "No-Till" and "Reduced Tillage" methods, with input levels categorized as either "High without manure" or "Medium," as outlined in Appendices 1 and 2.
AR TOOL- 02	(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) It appears that the project activities outlined in Section 1.15 are compliant with both national and local laws and regulations. Additionally, the lands involved in the project are legally owned by producers who have voluntarily registered in the project. The statement also asserts that there are no laws prohibiting the forestry or agroforestry use of the land. (ii) The "OYU- Reforesting in Uganda for a Better Tomorrow" project is not a small-scale project.
AR TOOL 03	This tool has no internal applicability conditions	The tool has no internal applicability criteria.
AR TOOL- 14	This tool has no internal applicability conditions	The tool has no internal applicability criteria.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Above Ground Biomass	CO_2	Yes	This is the major carbon pool subjected to project activity and but is expected to increase due to the implementation of the project activity.

Source		Gas	Included?	Justification/Explanation
		CH_4	No	GHG emissions in the baseline can be conservatively ignored
		N_2O	No	GHG emissions in the baseline can be conservatively ignored
		Other	N/A	
	Below Ground 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 in the baseline can be conservatively ignored
		N_2O	No	GHG emissions in the baseline can be conservatively ignored
		Other	N/A	
Project	Above Ground 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 emission throughout the project is negligible. Therefore, it is conservatively ignored
		N_2O	No	GHG emission throughout the project is negligible. Therefore, it is conservatively ignored
		Other	N/A	
	Below Ground 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 emission throughout the project is negligible. Therefore, it is conservatively ignored
		N_2O	No	GHG emission throughout the project is negligible. Therefore, it is conservatively ignored
		Other	N/A	

In addition to the table, provide a diagram or map of the project boundary, clearly showing the physical locations of the various installations or management activities taking place as part of the project activity based on the description provided in Section 1.11 (Description of the Project Activity) above.

For AFOLU projects, include in the diagram or map the locations of where the various measures are taking place, any reference areas and leakage belts.

Figure 8: Project Boundary of the project activity in Uganda[21]

Additional details on project boundaries are provided in Section 1.12, which covers Project Location, and Section 1.13, outlining Conditions prior to project initiation. These sections include maps illustrating project boundaries and provide a comprehensive overview of the management activities integral to the project.

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)[22]. The most likely baseline scenario is

[21] https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.researchgate.net%2Ffigure%2FMap-of-Uganda-showing-the-regions-of-the-country_fig1_334398273&psig=AOvVaw3Q8gwvfdrSRjRUCf6bR-A_&ust=1700304754746000&source=images&cd=vfe&opi=89978449&ved=0CBQQjhxqFwoTCJD0pfnuyoIDFQAAAAAdAAAAABAJ

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

the continuation of pre-project land use. The pre-project land use scenario mainly consists of the following land categories:

1.) Low productive grasslands

2.) Unproductive and/ or uncultivated croplands

3.5 Additionality

The Project Proponent has assessed and confirmed thoroughly the additionality of the project, and demonstrated 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) 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 1st March, 2021, and will last up to 28th February, 2072, and the project start date is 1st/March/2021, before the registration date and after 31/12/1999, as required by the tool.

This is demonstrated through the various geo-tagged images and receipts of payment between the project entities to show the start of planting activities post this date.

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

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

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

The alternative scenarios are described below:

Alternative scenario 1. Continuation of the pre-project land use;

The continuation of the pre-project land use refers to the scenario where the land is managed and utilized in the same way it was before the project began. This means that there are no significant changes or interventions in how the land is used, and it remains consistent with its historical or existing purpose.

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

The second scenario describes a situation where the land is planted with trees or vegetation within the project's designated area. However, in this scenario, the land has not undergone the official registration process as a VCS (Verified Carbon Standard) project.

This means that the project is proceeding with plantation activities, but it has not completed the necessary steps or documentation required for it to be officially recognized and certified under the Verified Carbon Standard, which is a widely recognized standard for carbon offset projects. This scenario might have implications for the project's eligibility for carbon credits or other benefits associated with VCS certification.

The above two identified land use scenarios are credible. All land uses within the boundary of the proposed A/R CDM project activity that are currently existing or that existed at some time since 31 December 1989 but no longer exist, may be deemed realistic and credible.

Outcome of Sub-step 1a: Both the alternate scenarios 1 and 2 are credible and would have occurred on the land within the project boundary of the A/R CDM project activity.

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

The scenario 1 and 2 in Sub-step 1a are in compliance with all mandatory applicable legal and regulatory requirements.

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 taking into account regardless of their active enforcement status in Uganda, while Scenario 2 encounters investment barrier, which will be addressed in the following section. Importantly, it does not violate any presently enforced mandatory laws and regulations.

If the project is not implemented, the most probable outcome for this project activity 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 low productive grasslands and uncultivated and/or unused croplands before any intervention associated with the project.

STEP 2. Barrier analysis

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

The land use scenario, establishment of plantations without the use of carbon finance, identified in Step 1b, is prevented by an investment barrier - insufficient financial returns. However, following the combined tool to identify the baseline scenario and demonstrate additionality, this barrier must be demonstrated by carrying out investment analysis.

Investment Barrier: Applies to Scenario 2

From the point of view of the primary stakeholders (farmers, landowners, and other participating members), there are barriers preventing the revegetation of these lands through plantation. Tree plantations require investment not only for obtaining seedlings but also for covering labour cost, expenses related to land preparation and post-plantation tending operations. In the case of participating farmers and landowners, this involves diverting land from current revenue pre-existing land use scenarios, such as cropland or grassland, for long-term gain.

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

The following is a list of land use scenarios that are not prevented by any barrier:

1.) Continuation of the pre-project land use scenario which includes- low productive grassland and unproductive and/or uncultivated croplands.

2.) Establishment of private plantations without the use of carbon finance.

STEP 3. Investment analysis

Sub-step 3a. Determine appropriate analysis method

Benchmark analysis is applied as the project generates revenues not just from the sale of VCUs.

Sub-step 3b. – Option III Apply benchmark analysis

The equity Internal Rate of Return (IRR) has been applied as the financial indicator for the ARR VCS project since there is only one potential project developer.

In line with the Additionality Tool, the benchmark is to represent standard returns in the market, considering the specific risk of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer.

The ideal method to obtain such a benchmark would be to analyse IRR expectations for private forestry operations in Uganda.

In the year 2023, the government of Uganda has imposed strict restrictions on timber exports that makes the commercial plantation business unprofitable and makes it difficult to achieve good profits even with the support of Sawlog Production Grant Scheme (SPGS).[23]

The export licence required for the export of timber is also difficult and the process is complex which create another major constraint in the adoption of commercial plantation at the large scale.[24]

The IRR benchmark will be calculated as per the current challenging scenarios and industry standards based in Uganda and will be added in the next version of this PDMR.

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

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

Sub-step 3c. – Option III Apply benchmark analysis

According to the current market restrictions, it has become challenging for the farmers/ landowners to achieve high IRR. This makes the commercial plantations business less profitable. Thus, it will compel the farmers/ landowners to invest in some other businesses in the long run.

With the help of carbon finance from the OYU Green's Revegetation project, farmers/ landowners will be able to achieve a higher IRR thus making it a profitable business for them. This will encourage them to adapt agroforestry practices while also increasing the green cover that benefits the local environment.

The project would therefore not have been viable without the potential of carbon financing. Without carbon revenues but including SPGS funding, the IRR is significantly higher than just the timber revenues scenario; however, including SPGS revenues but without carbon does still, however, show that the project would not reach the required benchmark

Sub-step 3c.- Sensitivity analysis

Sensitivity analysis should at least cover a range of +10 per cent and −10 per cent, unless this is not deemed appropriate in the context of the specific project circumstances. Sensitivity analysis was carried out to test whether the financial attractiveness was robust to reasonable variations in key parameters. The critical parameters were identified as timber prices, capex, growth yield, SPGS inclusion of Phase 2 and site indexes.

It is anticipated that this section will undergo regular updates, particularly during the first monitoring period, to reflect any changes in the project's dynamics or external economic factors. This iterative approach ensures that the sensitivity analysis remains relevant and aligned with the evolving landscape of the project, offering valuable insights for strategic decision-making.

STEP 4. Common practice analysis

Forestry plantations are rare in Uganda with private sector plantations even more so. No similar forestry activities have been implemented or are currently underway without the support of carbon financing. Small scale plantation forestry has also been done on small private forestland and as a means of protection against erosion in larger tea and coffee plantations, but similarly this doesn't class as the same activity.

The lack of private sector forest plantations in Uganda is shown in the SPGS report "Forestry Investment in Uganda[25]: This report highlights the constraints associated with exporting timber to other countries, revealing that such practices are not commonplace in Uganda. The existing barriers, as outlined in the report, contribute to the limited presence of private sector-driven forest plantations within the country.

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

Conclusion –

So, Step 4 of the project meets the criteria, showing that this kind of project isn't common. Therefore, the revegetation project is not the usual scenario but an extra effort to benefit the environment.

3.6 Methodology Deviations

No deviation of methodology was applied in this Project

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

The implementation status of the Project activity will be provided during the first monitoring. Currently, the PP is undergoing stakeholder consultations and doing plantation and monitoring works.

5 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.

The methodology allows the ex-post change in baseline carbon stocks to be deemed zero under certain conditions. Therefore, this section will:

1) calculate the baseline carbon stocks and,

2) demonstrate that the project meets the requirements that allow the change to be considered zero.

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:

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

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 the project 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:

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

$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t}$

To calculate the $\Delta C_{TREE\_BSL,t}$, the 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).

The Project Proponent deems $\Delta C_{TREE_BSL,t,}$to be zero because:

1) If found, Baseline trees are stratified separately. They are inventoried separately in the baseline strata and the data monitoring system. The project team counts and measures individual trees. The existing trees are acknowledged and the Carbon Dioxide removal executed by the same is tared[26] to be zero in the baseline emissions.

[26] "Tared" means **weighed, determined, or reduced to equal or standard weight**. For example, we can "tare" a container, wrapper, or vehicle to deduct its weight from the total weight to determine the weight of the contents or load.

2) At the time of creating baseline strata, farmers/ landowners attest to the fact that project activities have not led to deforestation. The presence of project trees is considered likely to mitigate the pressure for forest products and thus likely to protect these baseline trees.

3) The Project Proponent mandates that farmers/landowner plant trees at least 3 meters in spacing. Individual baseline trees are considered unlikely to experience mortality due to competition due to this spacing model.

4) Due to the lack of clearing of baseline trees, lack of competition, and separation of tree inventory, the ex-post baseline change in carbon stock is deemed zero.

5.2 Project Emissions

Ex-Ante Estimation

To estimate the carbon stock in tree biomass at a point in time the following tool was used: "AR-TOOL 14 Methodological tool: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities Version 04.2".

AR-TOOL 14 outlines several choices for estimation of ex-ante carbon stocks and calculation of ex-post carbon stocks. This project has chosen to use the approach outlined in Section 8.2 "Estimation by modelling of tree growth and stand development" for the ex-ante projections.

The methodology states:

"This method is used for ex-ante estimation (projection) of carbon stock in tree biomass. Under this method existing data are used in combination with tree growth models to predict the growth of trees and the development of the tree stand over time."

"Stand parameters such as stocking (e.g., number of stems per hectare or basal area per hectare), age-class structure, and species composition at different points of time are simulated from assumed (planned) tree planting and management practices (e.g., planting density, survival rate, thinning and pruning operations and their timing)."

"Tree growth (e.g., diameter or height increment) is simulated by considering local tree-growth data from past experience (e.g., age-diameter curves, yield tables, yield curves) while also considering relevant site factors (e.g., soil, terrain, slope, aspect, precipitation) and stand parameters."

"Ex-ante estimation (projection) of carbon stock in tree biomass is not subjected to uncertainty control, although the project participants should use the best available data and models that apply to the project site and the tree species."

The project applies the equation mentioned below for the ex-ante estimation of carbon stock in tree biomass as mentioned in the equation 3.2.3 of IPCC GPG LULUCF[27].

[27] Microsoft Word - Task1_Cover_TOC_Ack_Preface_20040312_jpeg.doc (ipcc.ch)

EQUATION 3.2.3
ANNUAL CHANGE IN CARBON STOCKS IN LIVING BIOMASS IN FOREST LAND REMAINING FOREST LAND (STOCK CHANGE METHOD)

$$\Delta C_{FF_{LB}} = (C_{t_2} - C_{t_1}) / (t_2 - t_1)$$

and

$$C = [V \bullet D \bullet BEF_2] \bullet (1 + R) \bullet CF$$

Where:

$\Delta C_{FF_{LB}}$ = annual change in carbon stocks in living biomass (includes above- and belowground biomass) in forest land remaining forest land, tonnes C yr^{-1}

C_{t_2} = total carbon in biomass calculated at time t_2, tonnes C

C_{t_1} = total carbon in biomass calculated at time t_1, tonnes C

V = merchantable volume, m^3 ha^{-1}

D = basic wood density, tonnes d.m. m^{-3} merchantable volume

BEF_2 = biomass expansion factor for conversion of merchantable volume to aboveground tree biomass, dimensionless.

R = root-to-shoot ratio, dimensionless

CF = carbon fraction of dry matter (default = 0.5), tonnes C (tonne d.m.)$^{-1}$

Ex-post estimation of the actual net Greenhouse Gas removals by sinks

To calculate the Ex-Post change in carbon stock, the project applies the method found in 6.2 of AR-TOOL 14 "Direct estimation of change by re-measurement of sample plots". As per the methodological tool, "the same sample plots are measured on two successive occasions and the plot-level change in biomass is obtained by subtracting the plot biomass on the first occasion from the plot biomass on the second occasion." Trees in this PDMR are stratified and monitored separately from baseline trees. Because they are new trees, biomass is considered to be zero at project start.

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

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$$

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* shall be calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$$

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

5.3 Leakage

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

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.

5.4 Estimated Net GHG Emission Reductions and Removals

The net anthropogenic GHG removals by sinks shall be calculated by using the formula given in section 5.7 of AR-ACM0003 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; tCO2e

$\Delta C_{BSL,t}$ = Net GHG removals by reservoirs at baseline in year t; tCO2e

LK_t = GHG emissions due to leaks in year t, tCO2e

Table given below will be updated at the time of first monitoring activity.

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
01-March-2021 to 28-Feb-2022	0	-	0	-
01-March-2022 to 28-Feb-2023	0	40,608	0	40,608

01-March-2023 to 28-Feb-2024	0	1,41,018	0	1,41,018
01-March-2024 to 28-Feb-2025	0	2,71,642	0	2,71,642
01-March-2025 to 28-Feb-2026	0	3,97,882	0	3,97,882
01-March-2026 to 28-Feb-2027	0	2,44,318	0	2,44,318
01-March-2027 to 28-Feb-2028	0	6,66,136	0	6,66,136
01-March-2028 to 28-Feb-2029	0	2,36,042	0	2,36,042
01-March-2029 to 28-Feb-2030	0	2,39,083	0	2,39,083
01-March-2030 to 28-Feb-2031	0	2,79,919	0	2,79,919
01-March-2031 to 28-Feb-2032	0	3,22,582	0	3,22,582
01-March-2032 to 28-Feb-2033	0	3,66,895	0	3,66,895
01-March-2033 to 28-Feb-2034	0	2,31,444	0	2,31,444
01-March-2034 to 28-Feb-2035	0	10,200	0	10,200
01-March-2035 to 28-Feb-2036	0	9,896	0	9,896
01-March-2036 to 28-Feb-2037	0	9,636	0	9,636
01-March-2037 to 28-Feb-2038	0	9,410	0	9,410

01-March-2038 to 28-Feb-2039	0	9,214	0	9,214
01-March-2039 to 28-Feb-2040	0	9,041	0	9,041
01-March-2040 to 29-Feb-2041	0	8,887	0	8,887
Total	**0**	**3,503,852**	**0**	**3,503,852**

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	**Locations of PMUs**
Data unit	Latitude and Longitude
Description	Single point location of a discrete project area
Source of data	GPS
Value applied:	KML file for GPS Worksheet
Justification of choice of data or description of measurement methods and procedures applied	Direct measurement of latitude and longitude of a point within a project area using a GPS. Used to provide a simple location of each Plantation Management Units (PMUs).
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**Boundary of PMUs**
Data unit	Latitude and Longitude

Description	Multiple waypoints that create a polygon around the boundary of a discrete project area
Source of data	GPS
Value applied:	KML file for GPS Worksheet
Justification of choice of data or description of measurement methods and procedures applied	Direct measurement of points of latitude and longitudes (waypoints) along the boundary of each Plantation Management Units (PMUs). The polygon is marked by walking along the perimeter of each PMU.
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**Project Area**
Data unit	Hectares
Description	Size of the project area where activities have been undertaken
Source of data	Latitude and Longitude of area under the project activity
Value applied:	10,000
Justification of choice of data or description of measurement methods and procedures applied	A calculated quantity based on the summation of all the polygon areas created for each Plantation Management Units (PMUs)
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**Ownership of Project Area**

Data unit	Name
Description	Ownership of each Plantation Management Units
Source of data	Land ownership documents collected while onboarding process
Value applied:	Not applicable
Justification of choice of data or description of measurement methods and procedures applied	A calculated quantity based on the summation of all the polygon areas created for each Plantation Management Units (PMUs)
Purpose of data	Authentication of PMUs under Project Boundary
Comments	None

Data / Parameter	**Baseline Trees**
Data unit	Count of Baseline Trees
Description	The number of trees existing under a Plantation Management Unit in the Baseline.
Source of data	Enumeration of trees physically by the team
Value applied:	Baseline strata worksheet
Justification of choice of data or description of measurement methods and procedures applied	Each baseline tree is marked and counted within the PMU for creating Baseline stratum. The project ensures that the marked trees are protected and not felled due to the project activities
Purpose of data	Authentication of PMUs under Project Boundary
Comments	None

Data / Parameter	**Baseline strata**
Data unit	Hectares
Description	The area of cropland or grassland at baseline.
Source of data	Estimate based on visual field observations.
Value applied:	Baseline strata worksheet
Justification of choice of data or description of measurement methods and procedures applied	The percentage of cropland and grassland are estimated for each individual project area. The percentage is multiplied by the area of the project area. The product is used as part of the procedure to determine if the change in baseline carbon stocks is expected to exceed 10% of the project removals.
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**Project trees**
Data unit	Count of tree
Description	The number of trees according to age and species strata in each project area.
Source of data	Trees are physically counted in the field by the field coordinators
Value applied:	Baseline strata worksheet
Justification of choice of data or description of measurement methods and procedures applied	The tree count by strata is used to extrapolate the ex-ante GHG removals.
Purpose of data	Calculation of project emissions
Comments	None
Data / Parameter	**Carbon Fraction (CFtree)**

Data unit	t C / t.d.m.
Description	Carbon fraction of tree biomass for species or group of species
Source of data	IPCC GPG LULUCF
Value applied:	0.47
Justification of choice of data or description of measurement methods and procedures applied	Default value as per the IPCC report28
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**Dtree**
Data unit	t.d.m./ m^3
Description	Basic wood density for tree species
Source of data	As per the available state and national forest inventory data
Value applied:	As per the tree species included
Justification of choice of data or description of measurement methods and procedures applied	Peer reviews or data published by IPCC
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**BEFtree**

[28] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Chp3_2_Forest_Land.pdf

Data unit	Dimensionless
Description	Biomass Expansion Factor
Source of data	IPCC GPG LULUCF
Value applied:	1.3 – 1.7
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value[29]
Purpose of data	Calculation of project emissions
Comments	None

Data / Parameter	**Rtree**
Data unit	Dimensionless
Description	Root-to-shoot ratio for species
Source of data	GHG Inventories[30]
Value applied:	0.27
Justification of choice of data or description of measurement methods and procedures applied	The ratios of Below Ground to Above Ground biomass (root-to-shoot ratio) is used to account for Below Ground Biomass in standing trees. The value of R is selected for the Tropical dry forest having above-ground biomass of more than 20 Tonnes/ha.
Purpose of data	Calculation of project emissions
Comments	None

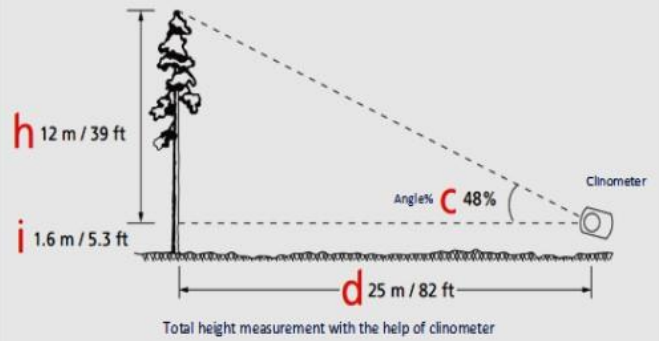
[29] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Chp3_2_Forest_Land.pdf

[30] GPG LULUCF

6.2 Data and Parameters Monitored

Data / Parameter	**DBH**
Data unit	Centimeters
Description	Diameter of tree at breast height (1.3m)
Source of data	Physical measurements
Description of measurement methods and procedures applied	Measured for trees of each age/species stratum in different Plantation Management Units
Frequency of monitoring/recording	Measurement is taken by the monitoring team, each time they visit Plantation Management Units
Value applied:	*N/A*
Monitoring equipment	Measuring Tape and Vernier caliper
QA/QC procedures applied	Standard operating procedures ensure accurate and validated data collection for monitoring parameters.
Purpose of data	Calculation of project emissions
Calculation method	Girth of the trees is measured at breast height (1.3m) which is converted to DBH
Comments	None

Data / Parameter	**Height**
Data unit	meters
Description	Height of a tree is measured either by height measuring instrument (Clinometer) or by ocular estimation

	 Total height measurement with the help of clinometer
Source of data	Physical measurements
Description of measurement methods and procedures applied	Measured for trees of each age/species stratum in different Plantation Management Units
Frequency of monitoring/recording	Measurement is taken by the monitoring team, each time they visit Plantation Management Units
Value applied:	*N/A*
Monitoring equipment	Measuring Tape and Clinometer
QA/QC procedures applied	Standard operating procedures ensure accurate and validated data collection for monitoring parameters. Field personnel must undergo comprehensive training in data collection, and a qualified individual should review field measurements to rectify any technique-related errors.
Purpose of data	Calculation of project emissions
Calculation method	Measurement according to monitoring plan
Comments	None

Data / Parameter	**Number of Trees**
Data unit	Trees
Description	Number of trees in a PMU by strata

Source of data	Physical Counts
Description of measurement methods and procedures applied	Physical count of trees in each stratum by the team
Frequency of monitoring/recording	Once per year
Value applied:	Tree count by strata
Monitoring equipment	Smartphone.
QA/QC procedures applied	Part of overall QA/QC procedures
Purpose of data	Calculation of project emissions
Calculation method	N/A
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, PP measures Diameter at Breast height (D) at 1.3-meter height from ground and Tree Height (H). The measured values are applied to the allometric equation given below to obtain Above Ground Biomass (AGB). For detailed calculation, please refer Ex-post Emission Reduction Sheet
Frequency of monitoring/recording	During each verification
Value applied:	Please refer the Ex-post Emission Reduction Sheet
Monitoring equipment	N/A
QA/QC procedures applied	Standard operating procedures ensure accurate and validated data collection for monitoring parameters.
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 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 the Ex-post Emission Reduction Sheet
Monitoring equipment	N/A
QA/QC procedures applied	Standard operating procedures 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

Data / Parameter	**Total CO_2**
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 assigned to each stratum. DBH and Height values are applied to the allometric equations. Average biomass of a tree in each stratum is calculated and multiplied by number of trees in each stratum. Biomass is converted to CO_2e and the CO_2e of the stratum is summed up.
Frequency of monitoring/recording	Calculation takes place with each monitoring report
Value applied:	Above and below ground biomass
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.4.5. requirements, seamlessly 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 the verification of project activities. Furthermore, it aims to accurately quantify the greenhouse gas (GHG) removal resulting from the proposed actions.

The specific objectives of the plan are:

- ✓ Verify carbon stock changes in each of the selected pools, for each area and specific reforestation model.
- ✓ Monitor project strata, by year of plantation and reforestation model;
- ✓ Verify project emissions and leakage emissions (if applicable);

- ✓ Determine operation, data collection, management and record procedures, as well as define roles and responsibilities.

The Plan follows the widely recognized Data Life Cycle structure, which can be visualized in a figure. This structure, along with its specific guidelines, addresses critical concerns such as data availability, ownership, and compliance with regulations, as well as the storage location and duration of data. To ensure accuracy and compatibility with local conditions, we will utilize established and widely used technology, methods, and standards. The Plan will consist of eight components, as outlined by Strasser et al. (2012 a,b) and Michener (2015).

- **Plan:** description of the data that will be compiled, and how the data will be managed and made accessible throughout the project's lifetime
- **Collect:** observations are made either by person or by sensors and will be digitally stored
- **Assure:** the quality of the data is assured through checks and inspections using internationally accepted standards
- **Describe:** data are accurately and thoroughly described using the appropriate metadata standards
- **Preserve:** data are submitted to an appropriate long-term archive for the duration of the existence of that archive
- **Discover:** potentially useful data are located and obtained, along with the relevant information about the data (metadata)
- **Integrate:** data from disparate sources are combined to form one homogeneous set of data that can be readily analyzed.

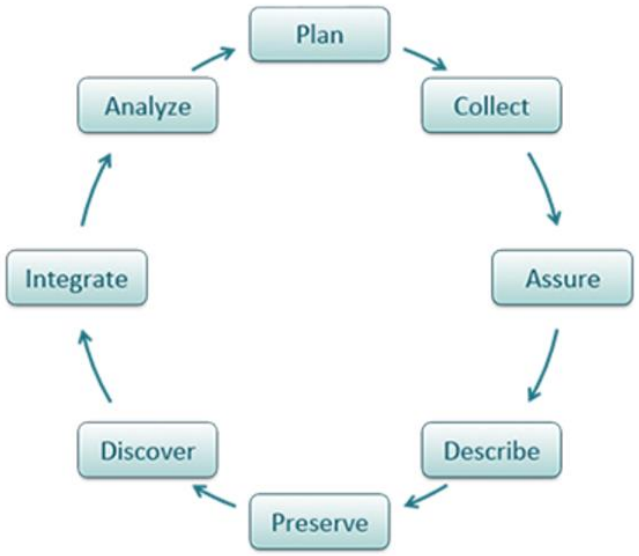
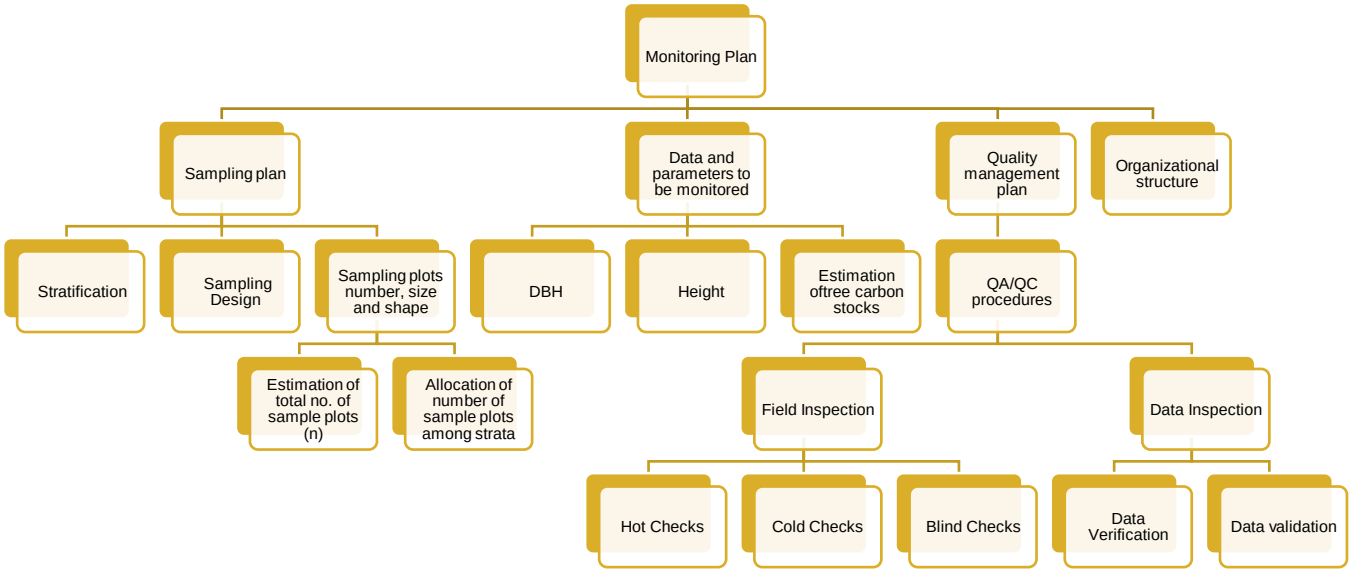


Figure 9 Data Life Cycle (Strasser et al. 2012b) (Image source: DataONE.org)[31]

Table: Selection of carbon pools

Carbon Pool	Selected	Justification
Above ground	Yes	Major carbon subject to the project activity
Below ground	Yes	Major carbon subject to the project activity
Dead wood	No	Conservatively omitted by the applied methodology
Litter	No	Conservatively omitted by the applied methodology
Soil organic carbon	No	Conservatively omitted by the applied methodology

[31] Image source: DataONE.org - Search Images (bing.com)



The processes and schedule for obtaining, recording, compiling and analysing the monitored data and parameters, as well as the methods for measuring, recording, storing, aggregating, collating and reporting data and parameters are presented as follows:

1. **Stratification** - The land parcels within the Project Activity 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. The land title records provide details on the cultivation areas for crops by farmers. Subsequently, the total area for each stratum is calculated based on the plantation year.

2. **Sampling design** - The data collection and sampling methods will use the standard operating procedure (SOP). Throughout the project, the monitoring team will work with permanent sample plots as they are the best option to estimate changes in carbon stocks in an efficient way. Monitoring plots will be distributed using a systematic random sampling approach for each stratum under each instance. The location of the permanent monitoring plots will be marked on a map and the geographical position (GPS coordinate) will be recorded and archived in the database of the project.

3. **Sampling -** Each pool will undergo measurement according to the prescribed methodology procedures and the Standard Operating Procedure (SOP). The estimation of carbon stocks in both above and below-ground biomass of trees will be conducted by applying allometric equations specified in the project document. These equations, based on Diameter at Breast Height (DBH) and root-to-shoot ratio (R), facilitate the conversion of tree measurements into

above-ground and below-ground tree biomass. The calculation of carbon stock will be based on a default carbon fraction (CF) value for precise estimation.

4. **Sampling plots number, size and shape** - The number of monitoring plots for each instance will be determined in accordance with the methodological tool "Calculation of the number of sample plots for measurements within A/R CDM project activities", which considers the strata present in the area.

   a. **Estimation of total number of sample plots (n) –**

   Number of sample plots required for estimation of biomass stocks within the project boundary is calculated iteratively. In the first iteration, the number of sample plots for the project area is calculated as:

$$n = \frac{N * t_{VAL}^{2} * \left(\sum_{i} w_i * s_i\right)^{2}}{N * E^{2} + t_{VAL}^{2} * \sum_{i} w_i * s_i^{2}} \quad (1)$$

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
w_i	Relative weight of the area of stratum *i* (i.e. the area of the 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^{-1})
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^{-1}), i.e. in the units used for s_i
i	*1, 2, 3, …* biomass stock estimation strata within the project boundary

For a small sampling fraction (that is, when area sampled is less than 5% of the project area), the following simplified equation can be used for estimating the number of sample plots:

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

where:

n	Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
t_{VAL}	Two-sided Student's *t*-value at infinite degrees of freedom for the required confidence level; dimensionless
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^{-1}), i.e. in the units used for s_i
w_i	Relative weight of the area of stratum *i* (i.e. the area of the 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^{-1})
i	*1, 2, 3, …* biomass stock estimation strata within the project boundary

For a large sampling fraction (that is, when area sampled is more than 5% of the project area), the number of plots calculated using equation 1 is adjusted as:

$$n_a = n * \frac{1}{1 + n/N} \quad (3)$$

where:

n_a	Adjusted number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
n	Number of sample plots required for estimation of biomass stocks within the project boundary, as calculated from equation 1; dimensionless
N	Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless

b. Allocation of number of sample plots among strata –

Number of sample plots allocated to a stratum is calculated as:

$$n_i = n * \frac{w_i * s_i}{\sum_i w_i * s_i} \quad (4)$$

where:

n_i	Number of sample plots allocated to stratum *i*; dimensionless
n	Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
w_i	Relative weight of the area of stratum *i* (i.e. the area of the 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^{-1})
i	*1, 2, 3, …* biomass stock estimation strata within the project boundary

Table: Proposed sampling plan

Type of sample plot	Permanent sample plot
Sample plot shape	To be provided at the time of first monitoring

Sample plot size	To be provided at the time of first monitoring
Number of sample plots	To be calculated according to forest variability using accepted formulas
Sample plot location	Sample plot coordinates, location, number, and other registration information will be stored.
Monitoring frequency	Sample plots will be monitored for each crediting period
Assessment of carbon stock changes over time	Changes will be estimated based on DHB and Height
Monitoring of GHG emissions due to the project activity	GHG emissions from the project activity will be monitored through systematic data collection and analysis in accordance with established protocols

Monitored Data and Parameters-

i. DBH (in cm)-

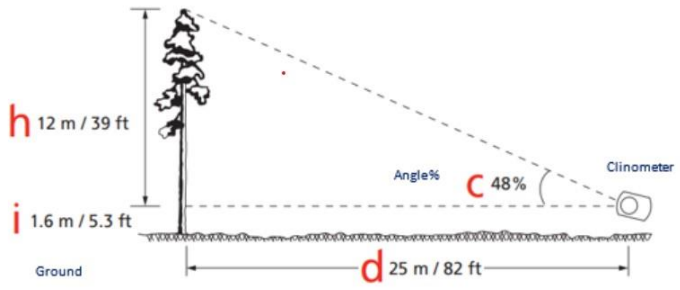
Diameter at Breast Height (DBH) and Height are pivotal parameters for estimating changes in tree biomass stock.

DBH is determined by measuring the Diameter at Breast Height (GBH) at 1.3 meters from the ground using a diameter tape, with the measurement point established by referencing a stick.

ii. Height (in m)-

Height of trees were measured using Clinometer instrument and also by ocular estimation. A clinometer instrument enabled to measure the distance from the tree and angles to the tree top and the tree base. Using a measuring tape, the distance is measured in meter from the base of the tree to the surveyor, where surveyor stand for measuring angle. Tree height is calculated using the below formula:

Height (H) = [Distance between tree and surveyor (m) x Angle (%)] + Eye level height of the Surveyor (m)



Calibration Frequency of the monitoring equipment is as below:

S.no.	Instrument	Calibration frequency	Remarks
1.	Measuring tape	Once in three years	Calibration shall be carried out by accredited laboratories
2.	GPS Instrument	Annually	
3.	Clinometer	Annually	

iii. Estimation of tree carbon stocks-

Utilizing the Sampling Tool (AR-TOOL 03 – "Calculation of the number of sample plots for measurements within A/R CDM project activities" Version 02.1.0), the number of sample plots in each stratum will be determined for calculating the average Diameter at Breast Height (DBH) and height of the trees per species. Allometric equations and Mean Annual Increment (MAI), identified through secondary research, will be applied to convert DBH and height values. This conversion process is integral to estimating biomass, subsequently leading to the determination of carbon stocks.

Organization of work under forest carbon inventory-

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 (blind, hot, cold checks etc)
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. OYU Green Buddy- • 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 field measurements:

- GA/QC Procedures-
    1. Field Inspection-
        a) Hot checks
        b) Cold checks
        c) Blind checks
    2. Data inspection-
        a) Data validation
        b) Data verification
- All field measurements activities are conducted in accordance with the standards for forest mensuration in Uganda. Training and experience of field members is documented in monitoring reports and entire work is supervised by the Program Managers of OYU Green team.
- After every field visit, the datasheets were undergone thorough review for completeness and legibility. Subsequently, they are scanned and stored in the project's database, along with the metadata and photographs. Data is entered into the spreadsheets by one team member and reviewed by another team member to ensure accuracy in entry. After a datasheet is entered and reviewed, the names of each person involved in entry and review along with the date entered, is recorded in the datasheet.

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

- All files are stored electronically into OYU Green's cloud servers. The Project will retain all relevant documentation for at least 2 years past the end of the project.
- The monitoring team strictly adheres to the monitoring plan in order to avoid any sort of non-conformances related to the project activities.

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 (1.3m)
Value applied:	*Provide the monitored value for the data/parameter*
Comments	None

Data / Parameter	**Height**
Data unit	meters
Description	Height of a tree is measured either by height measuring instrument (Clinometer) or by ocular estimation
Value applied:	*Provide the monitored value for the data/parameter*
Comments	None

Data / Parameter	**Number of Trees**

Data unit	Trees
Description	Number of trees in a PMU by strata
Value applied:	*Provide the monitored value for the data/parameter*
Comments	None

Data / Parameter	**Total CO_2**
Data unit	Tonnes
Description	Total CO_2e sequestered by the trees
Value applied:	*Provide the monitored value for the data/parameter*
Comments	None

7.2 Baseline Emissions

It will be provided at the time of first monitoring.

7.3 Project Emissions

It will be provided at the time of first monitoring.

7.4 Leakage

It will be provided at the time of first monitoring.

7.5 Net GHG Emission Reductions and Removals

It will be provided after First Monitoring

Quantify the net GHG emission reductions and removals achieved for this monitoring period, summarizing the key results using the table below. Specify breakdown of GHG emission reductions and removals by calendar year; VCUs are issued by calendar year in the Verra Registry.

For non-AFOLU projects, use the following table:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
Year A (DD-Month-YYYY-- DD-Month-YYYY)				
Year…				
Total				

For AFOLU projects, include quantification of the net change in carbon stocks. Also, state the non-permanence risk rating (as determined in the AFOLU non-permanence risk report) and calculate the total number of buffer credits that need to be deposited into the AFOLU pooled buffer account. Attach the non-permanence risk report as either an appendix or a separate document.

For AFOLU projects, use the following table:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)	Buffer pool allocation	VCUs eligible for Issuance
Year A (DD-Month-YYYY--DD-Month-YYYY)						
Year…						
Total						

For all projects, state the estimated ex-ante GHG emission reductions and removals and the achieved emission reductions and removals for this monitoring period. Report the percentage difference and justify the difference. The quantities of GHG emission reductions and removals are the total quantities before any deductions for buffer credits.

Ex-ante emissions reductions /removals	Achieved emissions reductions /removals	Percent difference	Justification for the difference

APPENDIX X: <TITLE OF APPENDIX>

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.