

TEMPLATE

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.2**

RELATED SUPPORT

- TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2

This document contains the following Sections

Key Project Information

0 – Description of project

0 – Application of approved Gold Standard Methodology (ies) and/or demonstration of SDG Contributions

0 – Duration and crediting period

0 – Summary of Safeguarding Principles and Gender Sensitive Assessment

0 – Outcome of Stakeholder Consultations

Appendix 1 – Safeguarding Principles Assessment (mandatory)

0 – Contact information of Project participants (mandatory)

0 – LUF Additional Information (project specific)

0 – Summary of Approved Design Changes (project specific)

This template has been revised to aid a consistent interpretation and to better support project developers submitting documentation for certification. Please read the accompanying guide to understand how to complete this template accurately.

[TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2](#)

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KEY PROJECT INFORMATION

GS ID of Project	GS 11648
Title of Project	Nature Conservation Reforestation project – Caatinga Biome, Ceará
Time of First Submission Date	19/08/2022
Date of Design Certification	Not available yet
Version number of the PDD	4.1
Completion date of version	14/04/2023
Project Developer	CO2logic
Project Representative	CO2logic Contact: Mathieu Cribellier Address: Cantersteen 47, 1000 Brussels Email: m.cribellier@southpole.com
Project Participants and any communities involved	Fortunat Ymbu Agroflorestal
Host Country (ies)	Brazil
Activity Requirements applied	<input type="checkbox"/> Community Services Activities <input type="checkbox"/> Renewable Energy Activities <input checked="" type="checkbox"/> Land Use and Forestry Activities/Risks & Capacities <input type="checkbox"/> N/A
Scale of the project activity	<input type="checkbox"/> Micro scale <input type="checkbox"/> Small Scale <input checked="" type="checkbox"/> Large Scale
Other Requirements applied	N/A
Methodology (ies) applied and version number	Gold Standard Afforestation/Reforestation (A/R) GHG Emissions Reduction & Sequestration Methodology – Version 1
Product Requirements applied	<input checked="" type="checkbox"/> GHG Emissions Reduction & Sequestration <input type="checkbox"/> Renewable Energy Label <input type="checkbox"/> N/A
Project Cycle:	<input checked="" type="checkbox"/> Regular <input type="checkbox"/> Retroactive

Land-use & Forest Key Project Information¹

Scope:	<input checked="" type="checkbox"/> Forestry <input type="checkbox"/> Agriculture
Silvicultural system:	<input checked="" type="checkbox"/> Conservation (no use of timber) <input checked="" type="checkbox"/> Selective Harvesting <input type="checkbox"/> Rotation Forestry
Project Area (ha):	953.83 hectares (total project area including land for communities) 917 hectares ² (total leased area for reforestation activities)
Eligible Area (ha):	649.81 hectares
10% Set Aside Conservation area (ha):	268.07 hectares (as per the Brazilian legislation, at least 20% have to set aside as conservation area)
Evidence that Project Area Boundary is clearly distinguishable in the field:	The project boundaries are determined using GPS to generate a polygon for the area included in the project. The project area is fenced and well-marked.
Planting Area	Total: 649.81 hectares Year 1: 32.7 hectares (realized) Year 2: 120 hectares (expected) Year 3: 497.11 hectares (expected)
How many Modelling Units (MUs) are included in the eligible area:	Only one MU defined
Summary of New Areas added (copy and insert as needed):	
Size (ha):	N/A
Date Added	N/A

Table 1 – Estimated Sustainable Development Contributions

Sustainable Development Targeted	Goals	SDG (defined in B.6.)	Impact	Estimated Annual Average	Units or Products
13 Climate Action (mandatory)		Emission reductions		4,516	VERs/year

¹ Please refer to 0 for detailed information on LUF projects

² Downrounded figure

8. Decent work and economic growth	Total number of jobs	20	Permanent Full-time jobs
		30	Temporary Full-time jobs
		10	Temporary part-time jobs
15. Life on land	Total area of trees planted (Native species)	649.81	Hectares

SECTION A. DESCRIPTION OF PROJECT

A.1 Purpose and general description of project

The project is situated in the Caridade municipality in the state of Ceará, Northeastern Brazil in the Caatinga biome. The Caatinga biome is the largest dry forest region in South America and has a rich biodiversity. However, this is much threatened since Caatinga has been constantly altered by slash-and-burn agriculture, logging and fuelwood extraction, causing both habitat loss and degradation. The Caatinga region exhibits one of the lowest social and economic indexes of the continent and extensive farming, imposed by the low and unpredictable net productivity of the Caatinga, has been causing a strong impact on vegetation³.

The project is implemented by Ymbu Agroflorestal LTDA, which is a reforestation company focusing on sustainability, technology and process quality with a positive environmental and social impact. The main goal of the 'Nature Conservation Reforestation project – Caatinga Biome, Ceará' project is to mitigate the effects of climate change through carbon sequestration in the tree biomass by restoring a natural biodiverse forest through the planting of native species. Additionally, the project aims to create jobs in rural areas through employing local community members in the nursery, planting and monitoring activities. The project is located on private land that is being leased. The total project area comprises a total of 917 ha of which 679.7 ha is considered eligible. The baseline scenario consists of predominantly shrubland and some minor part cropland.

A.1.1. Eligibility of the project under Gold Standard

The General Eligibility Criteria as per "Gold Standard For the Global Goals Principles & Requirements" is described below:

- (a) **Types of Project:** There exist a Gold Standard approved Activity Requirements and an Impact quantification methodology associated to the project activities (Reforestation) which makes the project eligible for Gold

³ Antongiovanni, M., Venticinque, E.M., Matsumoto, M., Fonseca, C.R. (2019). Chronic anthropogenic disturbance on Caatinga dry forest fragments. Journal of Applied Ecology.

Standard certification. The project makes use of the Gold Standard Afforestation/Reforestation (A/R) GHG emissions reduction & sequestration methodology, version 1.

- (b) **Location of Project:** Projects may be located in any part of the world.
- (c) **Project Area, Project Boundary and Scale:** The Project Area and Project Boundary shall be defined. Projects may be developed at any scale although certain rules, requirements and limitations may apply under specific Activity Requirements, Impact Quantification Methodologies and Products Requirements. The project Area and boundaries are defined (see paragraph A.2. The project is neither registered as a project activity with GS or any other standard. The relevant online carbon registries (CDM, GS, VCS) have been checked to confirm that there are no other similar projects in the region.
- (d) **Host Country Requirements:** The project is in compliance with Brazil's legal, environmental, ecological and social regulations. FORTUNAT has already started the licensing process in order to obtain the necessary licenses. In Brazil it is allowed and usual to start with a project after the licensing process had been started even though not all of the final licenses have been issued yet. It is expected that all necessary licenses will have been issued prior to submission of the project to SustainCert for Design Review.
- (e) **Contact Details:** The name and contact details of all project participants are included in the PDD under appendix II.
- (f) **Legal Ownership:** Land lease of private land for which land registration documents are available.
- (g) **Other Rights:** The land lease contract between Fortunat (project implementer) and land owner enables Fortunat all access rights and water rights within the property. There are no disputes or contested rights related to the property.
- (h) **Official Development Assistance (ODA) Declaration:** The project has not received and is not expected to receive any ODA. This has been confirmed in a signed ODA declaration.

The General Eligibility criteria of the specific "Gold Standard for the Global Goals Land use & Forest Activity Requirements – version 1.2.1" are described below:

- (a) *Eligible project types are Afforestation & Reforestation Projects (A/R) and Agriculture Projects (AGR)*

The project is eligible under Gold Standard as it applies an approved methodology, namely the Gold Standard Afforestation/Reforestation (A/R) GHG emissions Reduction & Sequestration Methodology, version 1.

- (b) *No deforestation: the eligible area shall not meet the definition of forest 10 years before the project start date and at project start date*

The forest definition used for the forest/non-forest assessment is based on the Brazilian Designed National Authority (DNA) host forest definition as per UNFCCC⁴.

The phenological characteristic of Caatinga forest is considered and satellite images were selected for leaf on period. The details of satellite data used for baseline assessment for the project site are tabulated below in table 2. The availability of satellite data is poor due to persistent cloud cover in the project area, therefore multiple scenes of Landsat 5 Thematic Mapper (TM) for 2011 and 2010 have been used and Landsat 8 Operational Land Imager (OLI) for 2021 was downloaded to conduct the spatial analysis.

Table 2: Details of satellite data used for forest/non-forest analysis

Satellite/Sensor	Path/Row	Date of Acquisition	Pixel Resolution (m)	Processing Level
LANDSAT-5-TM	217/63	22 nd May 2010	30	Level 1
LANDSAT-5-TM	217/63	07 th April 2011	30	Level 1
LANDSAT-8/OLI_TIRS	217/63	02 nd April 2021	30	Level 1

All the Landsat products were obtained from Image courtesy of the U.S. Geological Survey, Earth Explorer platform. The Landsat-5 TM images were taken for 2010 and 2011, to avoid the data gap caused by the Scan Line Corrector (SLC) failure and cloud cover.

The stepwise procedure of the forest and non-forest assessment is shown in the figure below.

⁴ According to the Designed National Authority (DNA) of Brazil, the forest definition is land area of minimum 1 hectare with tree height of 5 meters and a crown cover of 30%. Definition available at: <https://cdm.unfccc.int/DNA/index.html>

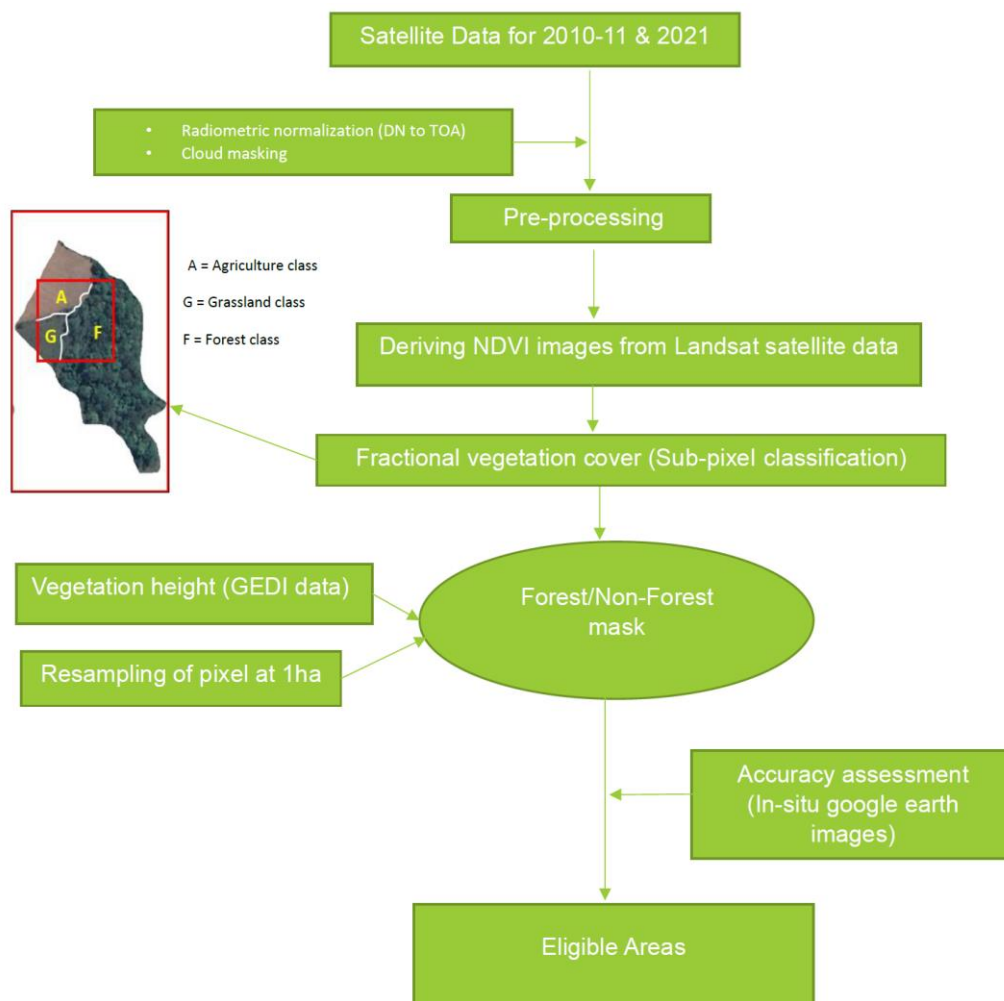


Figure 1: Methodology of Forest/Non-Forest mapping

The full procedure is described in the supporting document 'Report_FNF_Analysis_Ceara_BR_02052022_revised'.

The forest and non-forest vegetation cover maps for 2011 and 2021 are presented in figure 2 and 3 respectively.

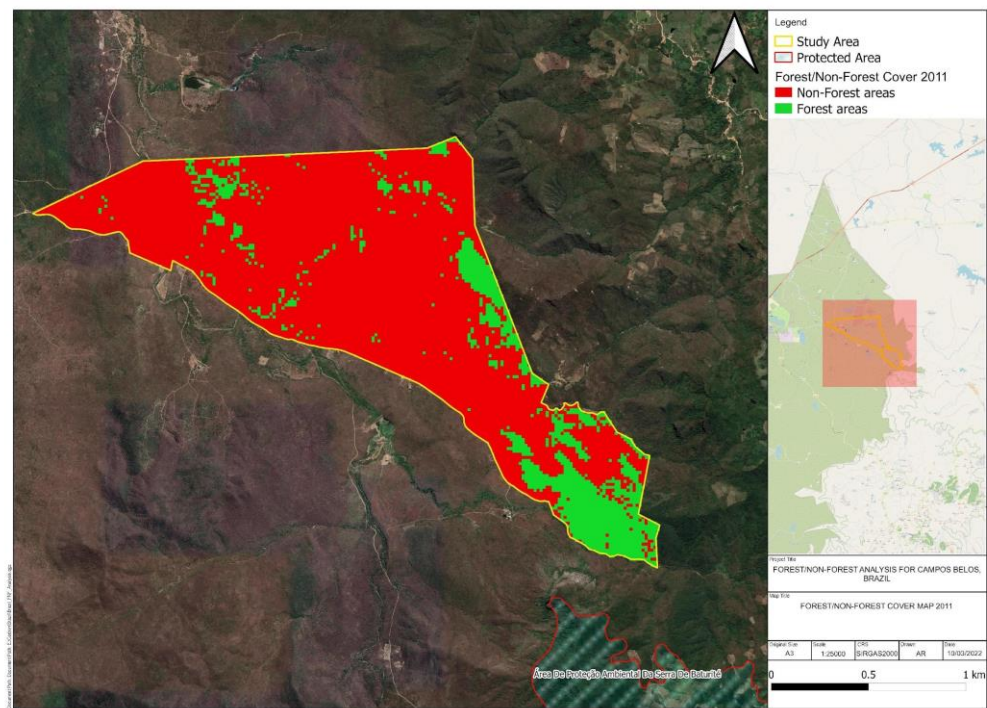


Figure 2: Forest/Non-Forest cover assessment for 2011

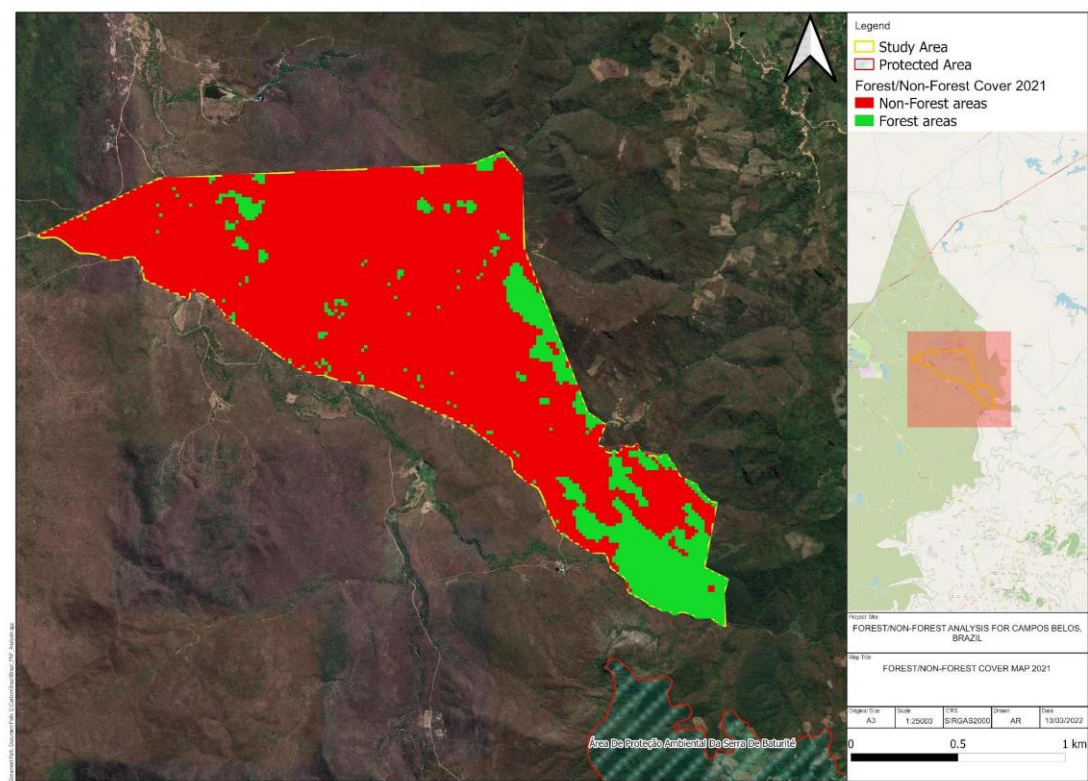


Figure 3: Forest/Non-Forest over assessment for 2021

The accuracy assessment of forest, non-forest map is assessed using the AcATaMa Qis plugin⁵, the application derived the optimum sample numbers using stratified random sampling based on the class area proportion (Cochran, 1977). The optimum sample numbers identified based on the proportion of forest and non-forest area for the project area are detailed below in table 3.

Table 3: Optimum number of sample plots used for accuracy assessment

Map class	Optimum sample plot
Non forest	335
Forest	61
Total	396

The accuracy assessment of forest and non-forest areas for 2021 are conducted using high resolution google earth images of study area. The overall accuracy of forest and non-forest areas is 93.18%, the detailed error matrix is presented in the annexure 1 of the supporting document 'Report_FNF_Analysis_Ceara_BR_02052022_revised'. The field investigation of caatinga forest vegetation in the study area was conducted to record the crown coverage vegetation with more than 5 m of height.

Finally, the identified eligible area was post classified to remove the water reservoir, streams, roads, mud paths, conservation area and habitation areas. The map of the eligible area is presented in figure 4, resulting in a total of 679.7 hectares of eligible area.

⁵ <https://smbyc.github.io/AcATaMa/>

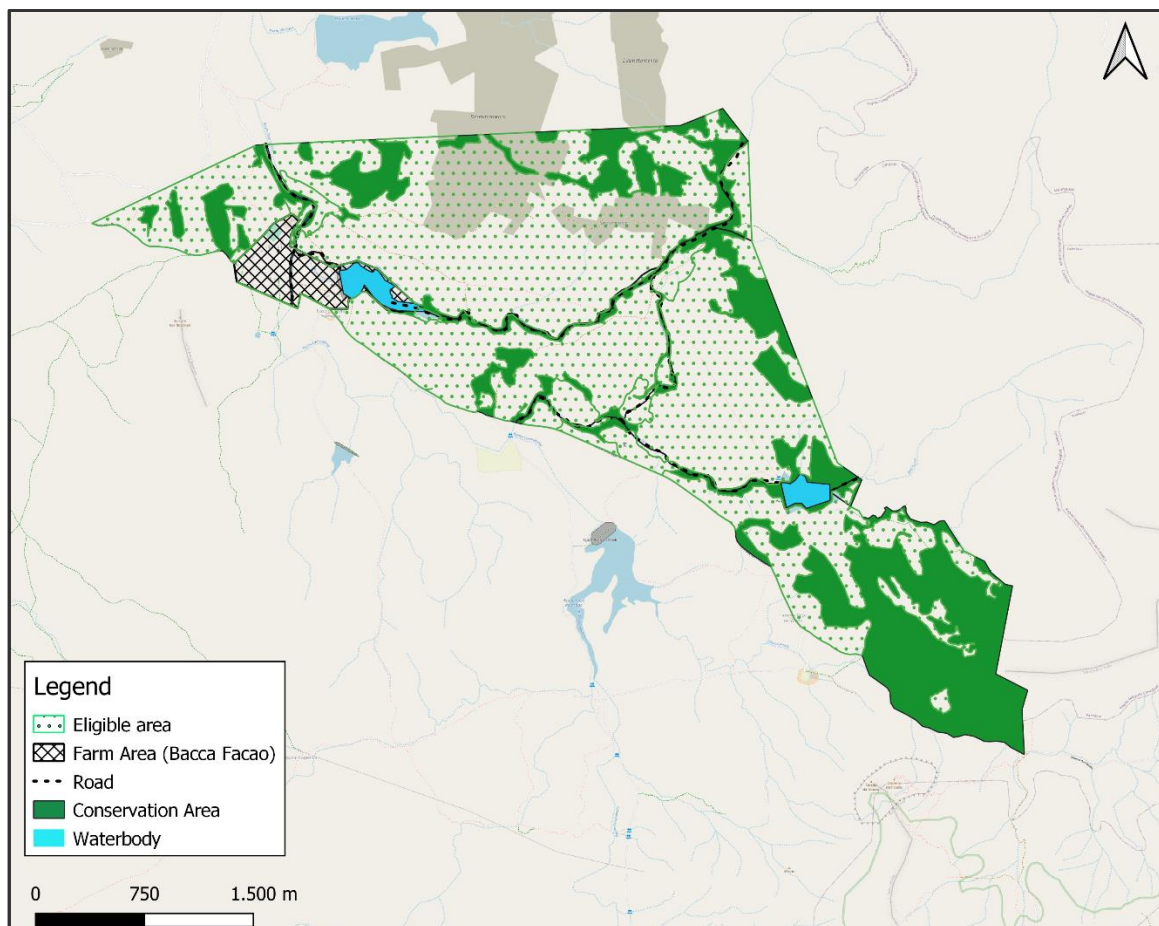


Figure 4: Eligible area map

- (a) *Projects can be implemented in any country. If project are located in a country or state that has an operational mandatory national or pan-national cap-and-trade scheme to reduce greenhouse-gas (GHG) emissions, and hereby accounts for its own land-based activities under its national or subnational accounting, then projects seeking GSVERs shall conform to the GHG Emission Reduction and Sequestration Product Requirements – Annex A Double Counting Requirements.*

Though the Brazilian government might implement a cap-and-trade in the future, the same has not been established yet.⁶ The project is an offsetting project under the voluntary market, hence would anyway not fall under the national accounting. The project activities are following national and international environmental, ecological and social laws and regulations. The project has not been registered under any other voluntary or compliance schemes and does not overlap with any other voluntary project.

⁶<https://www.mayerbrown.com/en/perspectives-events/publications/2022/05/brazils-federal-government-publishes-decree-establishing-national-greenhouse-gas-emissions-reduction-system>

A.1.2. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

All rights on carbon credits will be transferred to CO2logic, which will manage the credits in the name of Umicore. This is regulated in contracts between CO2logic and Umicore on the one side and between Fortunat and Umicore on the other side. This has also been communicated during the local stakeholder consultation.

The project area is located on private leased land. A contract between Fortunat and the landowner in line with the Brazilian legislation has been signed which gives Fortunat the full and uncontested legal tenure rights to implement the project.

There was a verbal agreement between the land owner and FORTUNAT which already permitted FORTUNAT to use the land some weeks prior to the signature of the lease agreement. This is confirmed by a declaration (submitted to SustainCert) given by the land owner.

A.2 Location of project

The project area, Fazenda Barra do Falcão, is situated in the northeastern part of Brazil, in the municipality of Cardidade located in the state of Ceará. The location of the project area is shown in figure 5. The precise boundaries of the project area can be found in separate GIS files (see 'GS11648_Project Area' in supporting documents).

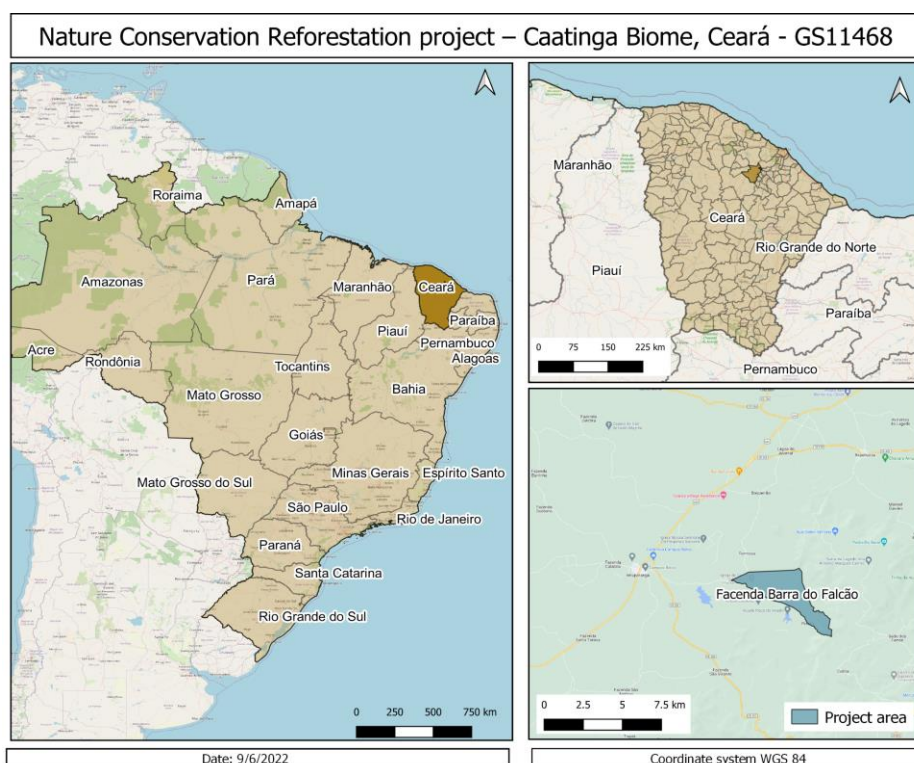


Figure 5: Location of project area

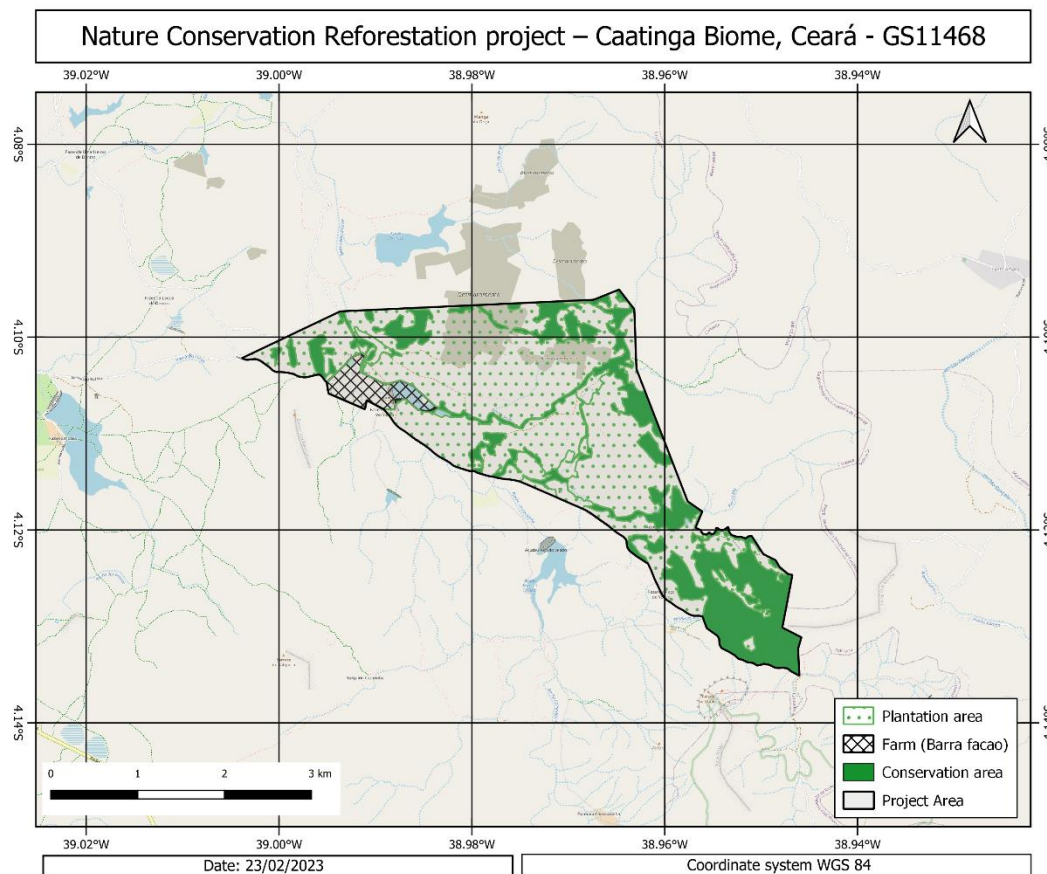


Figure 6: Project area

The project area is located on the border of two IPCC climate zones: the tropical moist and tropical dry climate zones.

In Brazil, the dry tropical forest is known as Caatinga and is located in the northeast of Brazil within the limits of the semi-arid region. The Caatinga biome is the largest dry forest region in South America and has a rich biodiversity. Caatinga vegetation types range from low shrubby caatinga (up to 1 m tall) associated with shallow sandy soils and a level or gently undulating surface, to tall caatinga forest (up to 25 to 30 m tall) associated with eutrophic soils derived from basic rocks. The climate of this ecoregion is hot and dry with 6 to 11 dry months. The average annual rainfall varies between 250 and 1,000 mm, and the average annual temperature is between 24° and 26°C.

The Caatinga Enclaves Moist Forest consists of five established patches of Atlantic Forest that are surrounded by a variety of dry Caatinga vegetation in northeast Brazil. The tropical climate has an annual rainfall averaging 1,300 to 1,500 mm and a dry season lasting from July through December.

The major causes of degradation in Caatinga are heavy grazing and browsing, unsustainable timber extraction for fuel, extensive and uncontrolled fires and, more recently, cotton cultivation expansion, causing both habitat loss and degradation. The Caatinga region exhibits one of the lowest social and economic indexes of the continent

and extensive farming, imposed by the low and unpredictable net productivity of the Caatinga, has been causing a strong impact on vegetation⁷. The pressure over the native areas might increase without government policies against the poverty imposed on many families, the main cause of deforestation in the region. Among the Brazilian ecosystems, Caatinga is the least protected, hosting only 7.1% of its territory in conservation units. Only 1% of the Caatinga is considered to be under a full protection⁸.

A.3 Technologies and/or measures

The Nature Conservation Reforestation project (Caatinga Biome, Ceará) promotes carbon sequestration through reforestation of native tree species on degraded land, formerly used for cotton plantations and now mainly covered with shrubs and to a minor extent still used for agriculture.

The objective is to manage 649.81 ha of mixed native plantations and 268.07 hectares of conservation area. This conservation area shall entail riparian buffers, steep slopes and additional unplanted area. 35.95 ha will remain to be used for agricultural activities of which around 5 ha are expected to be used for a syntropic agroforestry project.

Nursery practice

Seedlings are produced at the nursery set up by Ymbu. The seeds are mainly harvested from Ymbu and neighbouring properties, respecting genetic variability and only harvested from high quality matrixes. Additional seeds are purchased from partners in the region. These seeds are planted in the nursery in tubular plastic tubes which are kept in iron grates (see Figure 7). The design of the tubes ensures a better root structure and therefore higher chances of survivability. Climax and Secondary tree seedlings are produced in larger, 175ml tubes, which take around 6-8 months to be ready for field conditions. Pioneer tree seedling are produced in 55ml tubes, with 3-6 months development. The final 2 months in the nursery are the most important ones, when irrigation is reduced and the seedlings go into rustication, in order to adapt to field conditions. After, the saplings are transplanted to the field.

⁷ Antongiovanni, M., Venticinqu, E.M., Matsumoto, M., Fonseca, C.R. (2019). Chronic anthropogenic disturbance on Caatinga dry forest fragments. *Journal of Applied Ecology*.

⁸ Santos, M. G., Oliveira, M. T., Figueiredo, K. V., Falcão, H. M., Arruda, E. C. P., Almeida-Cortez, J., Sampaio, E. V. S. B., Ometto, J. P. H. B., Menezes, R. S. C., Oliveira, A. F. M., Pompelli, M. F., & Antonino, A. C. D. (2014). Caatinga, the Brazilian dry tropical forest: Can it tolerate climate changes? *Theoretical and Experimental Plant Physiology*, 26(1), 83–99. <https://doi.org/10.1007/s40626-014-0008-0>



Figure 7: Plant nursery

Site preparation, planting techniques and technologies

The site preparation and planting is carried out by a local team, equipped with 4 tractors adapted to optimize forest activities in the Caatinga. The project area covered by shrubland needs first to be cleared. The shrub vegetation is cleared and crushed with machinery and the crushed shrub vegetation will be left on the field as mulch to improve soil fertility. The land preparation is carried out in the dry season, between July and December.



Figure 8: Land clearing and crushed shrub vegetation left on the field

The planting of the saplings is done at the beginning of and during the rainy season, which takes place from January to April. Hence the planting period is around 4 months.

After clearing the vegetation, planting strips are mechanically made about 20-30 cm deep and 1,5m between the lines. Next, the saplings are planted mechanically while someone manually inserts the saplings into the machinery (see figure 9 on the right). The planting rate is about 7,000 trees per day, per machine. Additionally, 'manual'

planting is also performed, utilizing metal tubes which are also manually fed with saplings. Total planting capacity is aimed at a minimum of 25,000 trees per day.



Figure 9: Planting strips and planting of saplings

Planting configuration and regimes

The project will include a diverse forestry layout in order to maximize the positive ecological aspects of the project, creating a diverse ecosystem for native flora and fauna to flourish.

Planting activities will be realized in successional phases. Pioneer/initial secondary, late secondary and climax species were selected in order to permit the natural succession of forest development.

Their characteristics are the following:

- Pioneer/initial secondary species provide protection (shade) for the seedlings of the late secondary/climax species. This is particularly important in the dry season in order to minimize the mortality rate.
- The pioneer/initial secondary species (like e.g. Sabia and Juca) are usually leguminous trees, hence fix nitrogen in the soil and thus improve soil fertility for the late secondary/climax species.
- Succession is a principle of natural forests maximizing biomass production and accumulation of organic matter, hence carbon sequestration.

Planting of the project area will be done in 2-3 years and around 15-18 different species (see table 4) were selected, of which seeds are harvested from the region. The tree species were selected considering soil health promotion, its flowering and forage aspects, vital for native fauna, and its symbolism for the Caatinga Biome and for Brazil. A planting design was developed for the pilot year (2022), but has been adapted for the years 2023 and 2024. In the tables below the planting designs are shown.

Table 4: An overview of the planting design in 2022

Native Species common names	Number of Trees/hectare	Ratio	Spacing (meters)	Native Species scientific names	Successional Stage
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SABIÁ	1111	38%	3 x 1,5	<i>Mimosa caesalpinifolia</i>	Pioneer/Initial
JUCÁ/JUREMA BRANCA	555	19%	3 x 1,5	<i>Caesalpinia ferrea</i> / <i>Mimosa verrucosa</i>	Pioneer/Initial
CATINGUEIRA/TAMBORIL/ ANGICO/MUTAMBA	555	19%	3 x 1,5	<i>Cenostigma pyramidale</i> / <i>Enterolobium contortisiliquum</i> / <i>Anadenanthera macrocarpa</i> / <i>Guazuma ulmifolia</i>	Initial secondary
IPÊ ROXO/MULUNGU	277	9%	6 x 3	<i>Handroanthus impetiginosus</i> / <i>Erythrina velutina</i>	Late secondary
PEREIRO/BARRIGUDA /CUMARO / IMBURANA	277	9%	6 x 3	<i>Aspidosperma pyrifolium</i> / <i>Ceiba glaziovii</i>	Late secondary
AROEIRA	100	3%	9 x 6	<i>Myracrodruon urundeuva</i>	Climax
VIOLETE	85	2.9%	9 x 6	<i>Dalbergia cearensis</i>	Climax
Total	2,960				

Table 4: An overview of the planting design of the years 2023 and 2024

Native Species common names	Number of Trees/hectare	Ratio	Spacing (meters)	Native Species scientific names	Successional Stage
SABIÁ	718.32	24.24%	3 x 1,5	<i>Mimosa caesalpinifolia</i>	Pioneer/Initial
JUREMA PRETA	718.32	24.24%	3 x 1,5	<i>Mimosa tenuiflora</i>	Pioneer/Initial
JUCÁ	359.16	12.12%	3 x 1,5	<i>Caesalpinia ferrea</i>	Pioneer/Initial
CATINGUEIRA	359.16	12.12%	3 x 1,5	<i>Cenostigma pyramidale</i>	Secondary Initial
IPÊ ROXO	179.59	6.06%	6 x 3	<i>Handroanthus impetiginosus</i>	Late secondary
ANGICO	179.59	6.06%	6 x 3	<i>Anadenanthera macrocarpa</i>	Secondary Initial
GONCALO ALVES	179.59	6.06%	6 x 3	<i>Astronium fraxinifolium</i>	Secondary
AROEIRA	179.59	6.06%	9 x 6	<i>Myracrodruon urundeuva</i>	Climax
BARAÚNA	89.76	3.03%	9 x 6	<i>Schinopsis brasiliensis</i>	Climax
Total	2,963.08				

The idea is to also grow the following species which can be used as a potential substitute for the secondary species: *Aspidosperma pyriformium*, *Aspidosperma ulei* and *Cordia glabrata*.

Planting will be made in parallel lines 1.5 meters apart and fire corridors/accesses will be created every 100m. The figure below illustrates the planting lay-out which results in a planting density of around 2,960 trees per hectare.

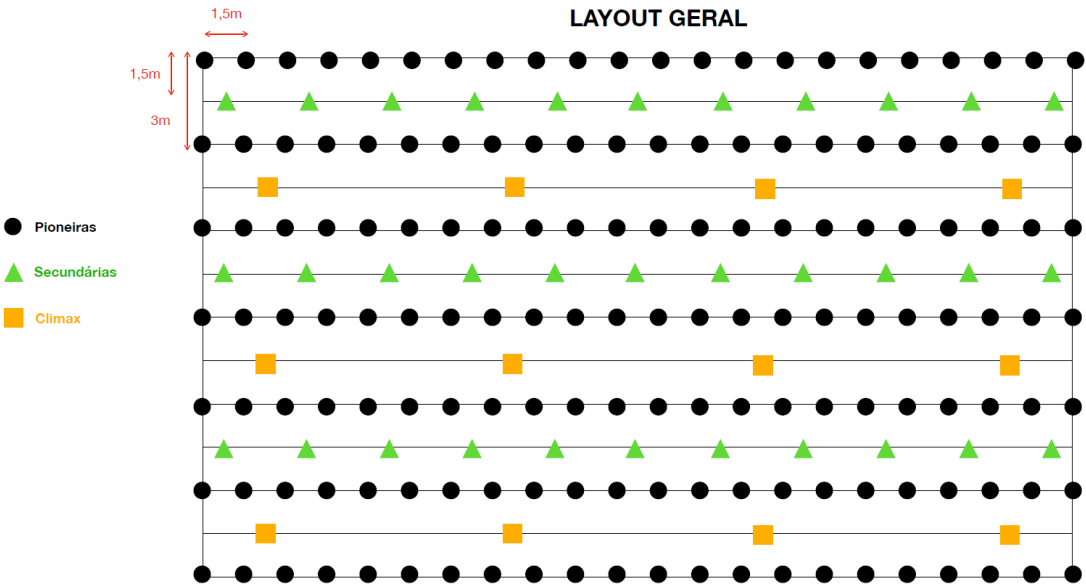


Figure 10: General planting lay-out

Maintenance process and activities

Maintenance of the plantations includes periodic weeding during the first years and coppicing of the Sabiá tree in year 10 in order to optimize the natural succession of the Secondary and Climax trees.

The use of ‘green fertilization’ plants, such as *Cajanus Cajan* (“Feijão-Guandu”) and *Panicum Maximum* (“Capim-Mombaça”) may be considered in between the tree lines, in order to protect the soil and increase water retention. The existing shrub biomass will be shredded and used as soil cover which benefits the survival of the seedlings. Existing trees will not be touched upon.

Timeline

In Year 01 a 32,7 hectare pilot area was implemented. In Year 02 and 03, the remaining 617.1 hectares will be implemented. An overview of the timeline of the project activities can be found in the table below:

Year	Activity
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Year 01 (Phase 00)	Contracts, licenses, land and seedling preparation. Planting of the initial 32,7 hectares of the project and preparing areas for future planting.
Year 02 (Phase 01)	Planting of 120,0 hectares of the project and preparing remaining areas for future planting.
Year 03 (Phase 02)	Planting of remaining 497,1 hectares (or more if eligible)
Year 04-09 (Phase 03-08)	General maintenance
Year 10 (Phase 09)	Coppicing of Sabiá trees, to allow re-growth. Coppicing of 500 Sabiá Trees per hectare (estimated to be 20% of the Sabiá AGB).
Year 11-34 (Phases 10-33)	General maintenance ⁹

A.4 Scale of the project

The project falls under the large scale project category. The project exceeds the threshold of 500 ha, hence cannot be classified as a microscale project. Nor is it composed of smallholders, hence not falling under the smallholder project category.

A.5 Funding sources of project

The company Umicore provides private equity funding for the entire project. No public funding/ODA is involved.

⁹ During the lifetime of the project, it will be evaluated whether a further coppicing of the Sabia trees beyond year 10 (e.g. in year 20) is needed in order to foster the growth of the remaining Sabia trees and other tree species and hence to maximize the CO₂ carbon sequestration. In case that a further coppicing of the Sabia trees will be conducted, the ex-ante carbon sequestration growth model would be adjusted accordingly.

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

The following GS Guidelines, Activity Requirements, Methodologies and tools have been used:

- [Gold Standard Principles & Requirements – Version 1.2](#)
- [Gold Standard Land use & Forests Activity Requirements – Version 1.2.1](#)
- <https://www.goldstandard.org/project-developers/standard-documents>
- Combined Tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities, version 01
- Tool for testing significance of GHG emissions in A/R CDM project activities, version 01
- Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities, version 01

B.2. Applicability of methodology (ies)

Applicability of Gold Standard Afforestation/Reforestation (A/R) GHG Emissions Reduction & Sequestration Methodology – version 2.0

1. Projects that include the planting of trees on land that does not meet the definition of a forest at planting start are eligible to apply this methodology

An eligibility analysis (including forest/non-forest assessment) was performed based on the analysis of Landsat satellite imagery (see section A.1.1 Eligibility of the project under Gold Standard for a more detailed description). It is confirmed through the eligibility analysis that the land on which planting will take place has not met the definition of a forest at planting start.

The project includes a silvicultural system with selective harvesting.

2. Project Areas shall not be on wetlands

The project area consists of shrubland and agricultural land and is located in the Caatinga biome where no wetlands are present. No wetlands are included in the project areas.

The outer boundary of the project area was plotted against soil type data available on Soil Grids¹⁰ from the International Soil Reference and Information Centre (see Figure 11).

¹⁰ <https://soilgrids.org/>
Gold Standard

According to this map, the project is dominated by Lixisols. Other soil types present are Luvisols, Leptosols and Planosols. Following the IPCC soil classification¹¹, these all belong to low activity clay LAC soils (Lixisols) or high activity clay HAC soils (Luvisols, Leptosols and Planosol). None of the project areas belong to the category of wetlands (FAO soil type Gleysol).

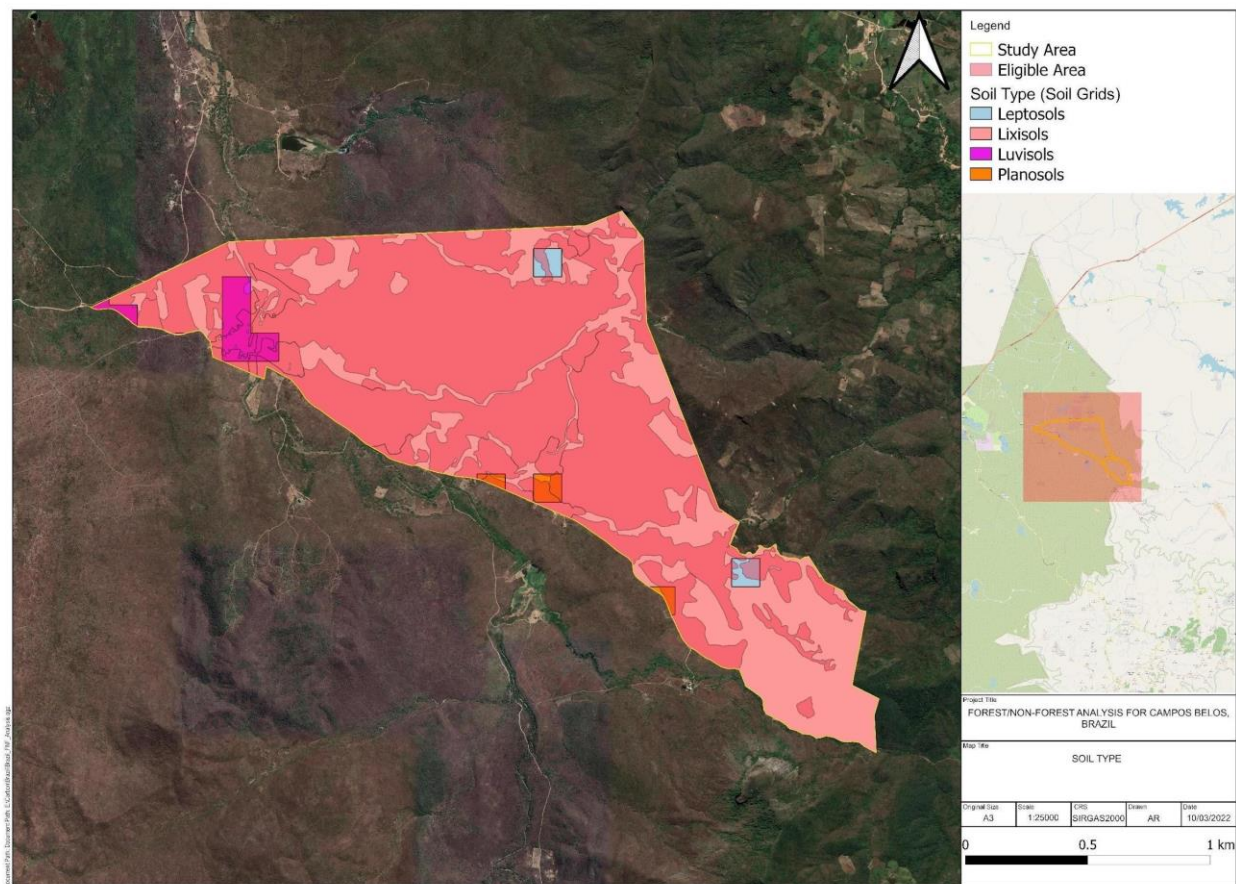


Figure 11: Map of eligible areas overlaid with soil type

3. Project Areas with organic soils shall not be drained or irrigated (except for irrigation for planting)

The methodology defines organic soils as following:

1. If the soil is never saturated with water for more than a few days, and contains >20% (by weight) of organic carbon (35% organic matter)
2. If the soil is subject to water saturation episodes and has either:
 - a. 12% (by weight) organic carbon (20% organic matter) if it has no clay
 - b. 18% (by weight) organic carbon (30% organic matter) if it has >60% clay
 - c. a proportional lower limit of organic carbon content between 12 and 18% if the clay content of the mineral fraction is between 0 and 60

¹¹ <https://edepot.wur.nl/51469>

The project land does not contain organic soils as demonstrated in the soil classification above. In addition, the project activities do not involve any drainage or irrigation. Hence, this applicability criterion is not applicable.

4. Soil disturbance (through ploughing, digging of pits, stump removals, infrastructure, etc.) on organic soils shall be in less than 10% of the area that is submitted to certification (not 10% of the entire project area)

Given the information outlined above, this requirement does not apply as the project land does not contain organic soils.

5. The most likely scenario without the project (baseline scenario) shall be defined for the project area. This scenario shall not show any significant¹² increase of the Baseline biomass ('tree' and 'non-tree').

The most likely baseline scenario, continuation of the pre-project land use as defined in section B.4, does not show any significant increase of the baseline biomass.

According to the land cover analysis (baseline scenario), most of the project area is covered by shrubland.

6. Projects shall apply the Gold Standard Land-use Activity Requirements as applicable to A/R Projects.

This project applies the Gold Standard Land-use Activity Requirements, version 1.2.1.

B.3. Project boundary

Overview of the carbon pools included. No other GHGs apart from CO₂) are included as they only present minor emission sources. Hence, the below mentioned table refers solely to CO₂. No biomass will be burned and no fertilization will be used. The combustion of fossil fuels is considered insignificant and may therefore be neglected according to the methodology.

Carbon Pools		Included?	Justification/Explanation
Tree biomass	Aboveground	Yes	All tree and shrub biomass existing in the planting area will be accounted for following the requirements for baseline carbon stock estimation
	Belowground	Yes	Belowground biomass will be included in the baseline estimations in accordance with the applied methodology

¹² Significant is defined to be more than 5% of the 'long-term CO₂-Fixation' - see 'CO₂-Fixation'.

Non-tree biomass	Aboveground	Yes	The non-tree biomass (grass, herbs) is not significant in the planting area, hence can be excluded
	Belowground	Yes	The non-tree biomass (grass, herbs) is not significant All shrub biomass existing in the planting area, hence can be excluded
Soil		No	A certain increase of soil organic carbon (SOC) can be expected due to the project activity on the croplands. However the SOC pool is considered insignificant (see 403_V1.0_0.7_LUF_AR Methodology_Soil Carbon Tool_GS11648) and is therefore not taken into account.
Tree Biomass	Aboveground	Yes	Major carbon pool subject to the project activity
	Belowground	Yes	Major carbon pool subject to the project activity
Non-Tree biomass	Aboveground	No	Insignificant carbon pool in project scenario
	Belowground	No	Insignificant carbon pool in project scenario
Litter & Dead Wood		No	Insignificant carbon pool which can be conservatively excluded according to the methodology

B.4. Establishment and description of baseline scenario

To identify and justify the baseline scenario the 'Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities, version 1' was selected and utilized. The following steps were applied:

- STEP 0. Preliminary screening based on the starting date of the A/R project activity
- STEP 1. Identification of alternative land use scenarios to the proposed project activity
- STEP 2. Barrier analysis
- STEP 3. Investment analysis (if needed)
- STEP 4. Common practice analysis

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

- Provide evidence that the starting date of the A/R CDM project activity was after 31 December 1999

Gold Standard

The start date of the project activities was on 04/04/2022. This is the date the first planting activities took place. Hence, step 0 is not applicable.

- Provide evidence that the incentive from planned sale of VERs was seriously considered in the decision to proceed with the project activity.

Not applicable. Since the project activity is a regular project. LSC consultation took place prior to project start date.

Step 1. Identification of alternative land use scenarios to the proposed project activity

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

Besides shrubland, there are to a smaller extent some agricultural activities on the project site.

The following credible land use scenarios will be evaluated:

- Continuation of the pre-project land use, i.e. the land stays shrubland and to a small extent cropland.
- Project activity on the land, which is reforestation with mixed native plantations, within the project boundary performed without being registered as a carbon project
- Commercial reforestation monoculture project with only one type of tree

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

The project area is located on private land, for which a lease agreement between land owner and Fortunat is signed. All identified options above comply with the laws and regulations.

Step 2. Barrier analysis

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

Table 1 displays the barrier analysis matrix which identifies alternatives and barriers. A more complete discussion of the barriers follows below.

Alternative land use scenarios	Investment	Institutional	Technological	Local tradition	Prevailing practice	Local ecological conditions	Social conditions
Continuation of the pre-project land use							
Project activity on the land, reforestation with mixed native plantations without incentives from the carbon market	X		X		X		
Commercial reforestation monoculture	X						

Investment barriers

Investment is a key barrier to the project development. Finance is needed for the preparation of the land, nursery activities, planting and maintenance. Sabia revenues could cover only around 20% of the project costs¹³; apart from that there are no other revenues except from carbon credits.

For a commercial reforestation (monoculture) project, it would be extremely difficult to access finance. Since the Caatinga area does not provide equivalent fast growth rates for commercial species, like Eucalyptus, Khaya, Teak etc. as tropical and sub-tropical areas. A proper infrastructure would have to be built up for exploitation and further processing which requires a lot of up-front capital.

Technological barriers

The high amount of different species included in the project requires a good knowledge of the different species and mixed forest plantations to be able to have a successful project.

Prevailing practice barrier

There is no other project in Ceará with a similar scale and similar nature (mix of different species planted as nature conservation project with a very low percentage of coppicing).

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

¹³ There will be selective harvesting of certain Sabia poles. Sabia trees usually consist of 3 to 4 poles and in order to stimulate growth of the Sabia trees itself as well as the neighbouring trees, some coppicing of certain poles will take place. It is expected that this coppicing takes place after 10 to 12 years and if really needed another coppicing later on.

Elimination of the following land use scenarios prevented by one or more of the identified barriers:

The barriers identified in the previous sub-step may prevent the implementation of the reforestation scenarios. Without the economic incentives obtained from the carbon project, the proponent would face investment barriers that would prevent the development of the reforestation projects. The continuation of the pre-project land use is not prevented by any barriers.

Sub-step 2c. Determination of baseline scenario (if allowed by barrier analysis)

The most plausible land use scenario in the absence of the project is the continuation of shrubland and to a small extent cropland.

Step 3. Investment analysis (if needed)

The outcome of step 2 allows to skip step 3 and continue with step 4.

Specify the methodology, activity requirement or product requirement that establishes deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities, version 01
Describe how the proposed project meets the criteria for deemed additionality.	The establishment of a mixed native plantations is not a common practice in the region, as evidenced by additionality analysis in above paragraph.

Step 4. Common practice analysis

The project activity is the first-of-its kind in the State of Ceara (see section “prevailing practice barrier”).

For this reason, the project activity is not considered as a common practice and is considered additional.

B.5. Demonstration of additionality

B.5.1 Prior Consideration

N/A since the project is regular

B.5.2 Ongoing Financial Need

According to the ‘Principles and Requirements version 1.2, section 4.1.52’, ongoing financial need shall be demonstrated at Design Certification Renewal.

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

Sustainable Development Goals Targeted	Most relevant SDG Target	SDG Impact
		Indicator (Proposed or SDG Indicator)
13 Climate Action (mandatory)	N/A	Emission Reductions
8. Decent work and economic growth	Target 8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons disabilities, and equal pay for work equal value	Total number of jobs
15. Life on land	Target 15.8: By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	Total area of trees planted (Native species)

B.6.1 Explanation of methodological choices/approaches for estimating the SDG Impact

SDG 8 Decent Work and Economic Growth

The project shall monitor the following information:

- Total number of employees by employment contract (permanent and temporary), by gender
- Total number of employees by employment type (full-time and part-time), by gender

Employee contract refers to a contract as recognized under national law or practice that can be written, verbal or implicit.

Full-time: a 'full-time employee' is an employee whose working 44 hours¹⁴ per week, according to Brazilian national legislation and practice regarding work time.

Part-time: A 'part-time employee' is an employee whose working hours per week, month, or year are less than 'full-time'.

¹⁴ <https://www.tst.jus.br/jornada-de-trabalho>

SDG 15 Life on land

The 'GS Standard Afforestation/Reforestation (A/R) GHG emissions Reduction & Sequestration Methodology – version 1' will be used to estimate the increment in above ground and below ground biomass growth.

Total area of trees planted (Native trees) is calculated with following formula:

$$\frac{ha\ of\ native\ species\ * mortality\ rate}{total\ planted\ area}$$

OR

$$\frac{number\ of\ planted\ native\ trees}{total\ number\ of\ planted\ trees} * 100$$

As per the Bern convention from 1979¹⁵, native tree species are defined as species that have been observed in the form of a naturally occurring and self-sustaining population in historical times.

SDG 13 Climate Action

To quantify the total GHGs emission reductions (ERs) sequestered, the project uses the 'GS Standard Afforestation/Reforestation (A/R) GHG emissions Reduction & Sequestration Methodology – version 1'. A summary can be found below.

The total number of CO2 certificates is determined for every year (t) of the crediting period for each modelling unit using the following formula:

$$CO_2certificates = (CO_2fixation - Baseline - Leakage - Other\ Emissions) * Eligible\ planting\ area$$

With the applicability conditions, the methodology assumes no significant increase in the baseline, so the baseline is only deducted in year 1 (t=1). Any potential leakage is as well deducted in the first year.

$$CO_{2_certificates\ project\ area,\ t} = \sum_{MU=1}^{MUs} \sum_{t=1}^{CP} CO_{2_certificates\ MU,\ t}$$

Where:

$CO_{2_certificates\ project\ area,\ t}$ = CO2-certificates of a project area in year t [tCO2e]

$CO_{2_certificates\ MU,\ t}$ = CO2-certificates of a MU in year t [tCO2e]

MUs = 1,2,3.. MUs of the project area

t = 1,2,3, .., 34 years of the crediting period

CP = year the crediting period ends

The carbon pools taken into account are shown in Table 5

Table 5: Carbon pools accounted for the project

Carbon pool		CO2 fixation	Baseline	Leakage
Tree biomass	Aboveground	Yes	Yes	Yes

¹⁵ <https://www.biodiversitya-z.org/content/native-species>

	Belowground	Yes	Yes	Yes
Non-tree biomass	Aboveground	No	Yes	No
	Belowground	No	Yes	No
Soil		No	No	No
Harvested wood		No	No	No
Litter and lying deadwood		No	No	No

- CO₂ Fixation

$$CO_2 \text{ fixation} = (\text{aboveground tree biomass} + \text{below ground tree biomass}) * CF * C \text{ to } CO_2 \text{ factor}$$

Where:

CF = Carbon fraction (value specified in section B6.2)

C to CO₂ factor = value specified in section B6.2

Aboveground tree biomass

The ex-ante estimation of the above ground tree biomass growth is based on secondary data. More information can be found in 'Emission reduction_GS11648_Ymbu'.

The ex-post estimation of the above ground tree biomass will be based on forest inventories that will be carried out each performance verification. Dendrologic measurements will be taken which will be converted to above ground biomass estimates with the volumetric method or allometric method, depending on the available data.

Belowground tree biomass

The below ground tree biomass is calculated with following formula:

$$\text{Belowground tree biomass} = \text{Aboveground tree biomass} * \text{Root to shoot ratio}$$

- Baseline

A baseline biomass assessment was carried out to determine the existing average carbon stock per hectare present on the existing shrubland. The shrub biomass is being removed prior to planting, hence has been discounted in the carbon calculation in year 1. Existing mature trees will remain untouched, however have been discounted in the carbon calculation in year 1, too. Therefore, the biomass of those trees can be included later on during the measurements of the project inventories.

The baseline inventory resulted in a baseline carbon stock for shrublands of 29.78 tCO₂e including both aboveground and belowground biomass. 18 shrubland plots (of each 20m

x 20m)¹⁶ were randomly selected in QGIS over the project area. The results comply with the 20% precision level as required by Gold Standard. For more details, see the excel spreadsheet "Overview inventory baseline plots_including statistical analysis_v3.0.xlsx".

For croplands, the baseline carbon stock results in 0. Since no tree and no non-tree biomass has been identified on the 2 sampled cropland plots.

- Leakage

Leakage are emissions that occur due to a shift of activities from inside of a project area to the outside of a project area. Leakage is not expected to occur.

- Collection of wood: not present in project area in the pre-project scenario
- Timber harvesting: not present in project area in the pre-project scenario
- Agriculture: Agriculture has been practiced in a rotational manner in the project area on total land area of 10 hectares. The land owner will maintain 20 hectares for these traditional practices. This area will be fenced to separate this area from the planting areas. Additionally, a Syntropic Agriculture course is being developed, which intends to create more productivity in smaller plots of land. The idea is to start a pilot in a plot of max. 5 hectares. These activities will guarantee no leakage from the existing practices.
- Livestock: There are around 20 cows present on the project area. These will be moved to a designated area (35.95 ha) within the project area which is however outside of the planting area.

- Other emissions

No biomass is burned during the land preparation and no fertilizers are used on the sites. Therefore there are no other emissions that should be accounted for.

B.6.2 Data and parameters fixed ex ante

SDG13

Data/parameter	Eligible project area
Unit	ha
Description	Eligible project area as per Gold Standard Requirements
Source of data	GIS
Value(s) applied	649.81 hectares of eligible area

¹⁶ The results of one shrubland plot revealed to be an outlier, hence finally 17 plots have been used for the statistical analysis.

Choice of data or Measurement methods and procedures	See section A.1.1
Purpose of data	Calculation of project scenario
Additional comment	

Data/parameter	Baseline biomass stock
Unit	t.d.m. (tonnes dry matter)/ha
Description	Total aboveground biomass of the land cover in the baseline scenario
Source of data	Baseline biomass assessment See "Overview inventory baseline plots_including statistical analysis_v3.0"
Value(s) applied	Shrubland: 12.18 (aboveground biomass) Cropland: 0.00
Choice of data or Measurement methods and procedures	Baseline biomass inventories
Purpose of data	Calculation of baseline scenario
Additional comment	The aboveground baseline biomass stock of each shrubland plot is multiplied with 1.334 (this includes the root-to-shoot ratio for the belowground biomass), with 0.5 (biomass to carbon conversion factor) and 44/12 (carbon to CO2 conversion factor). This results in an average of 29.78 tCO2e/ha for shrubland.

Data/parameter	Above-ground biomass growth for the planting design in 2022
Unit	4.60 t.d.m./ha/year
Description	Average yearly above-ground biomass growth

Source of data	<p>(1)IPCC. (2019). 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories -CHAPTER 4 Forest land. Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, 4, 194. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf</p> <p>(2) Moura, O. N., Passos, M. A. A., Ferreira, R. L. C., Molica, S. G., Lira Junior, M. de A., Lira, M. de A., & Santos, M. V. F. dos. (2006). Distribuição de biomassa e nutrientes na área de Mimosa caesalpiniaefolia Benth. Revista Árvore, 30(6), 877–884. https://doi.org/10.1590/s0100-67622006000600002</p> <p>(3) Galdino da Silva, M. (2017). Crescimento, produção e distribuição de biomassa de espécies florestais em resposta ao método de cultivo. Universidade Federal Do Rio Grande Do Norte, 2, 19.</p> <p>(4) Drumond, M. A. (2013). Potencialidades de algumas espécies arbóreas madeireiras do bioma caatinga.</p> <p>(6) Mello, A. A., Meira, A. C. S., Sanquetta, C. R., & Ferreira, R. A. (2019). Estimativas De Biomassa E Carbono Em Área De Mata Atlântica, Implantada Por Meio De Reflorestamento Misto. BIOFIX Scientific Journal, 5(1), 130. https://doi.org/10.5380/biofix.v5i1.67298</p> <p>(7) Pereira da costa, E. J. (2020). MUDANÇAS NA ESTRUTURA DA VEGETAÇÃO EM UMA ÁREA DE CAATINGA ENTRE 2015 E 2019.</p> <p>(8) Guerin, N. (2019). Potencial de plantios homogêneos de espécies nativas para catalisar a recuperação da biodiversidade e proporcionar o uso sustentável da Reserva legal. Universidade de São Paulo Escola Superior de Agricultura " Luiz de Queiroz ."</p>
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Value(s) applied		Native Species scientific names	Ratio	AGB growth (tdm/ha/year)	Source
		<i>Mimosa caesalpiniiifolia</i>	38%	7.35	(2), (3), (4)
		<i>Caesalpinia ferrea/Mimosa verrucosa</i>	19%	3.00	(1)
		<i>Cenostigma pyramidale/ Enterolobium contortisiliquum/ Anadenanthera macrocarpa/ Guazuma ulmifolia</i>	19%	3.00	(1)
		<i>Handroanthus heptaphyllus/ Erythrina velutina</i>	9%	2.77	(6), (7), (8)
		<i>Aspidosperma pyrifolium/ Ceiba glaziovii / Amburana cearensis / Commiphora leptophloeos</i>	9%	3.00	(1)
		<i>Myracrodruon urundeuva</i>	3%	2.72	(4)
		<i>Dalbergia cearensis</i>	2.9%	3.00	(1)
		Weighted average	100%	4.60	
Choice of data or Measurement methods and procedures	Due to a lack of primary data, the ex-ante estimation is based on species specific and international secondary data sources. For those species for which no species specific data was available, the default value for above-ground net biomass growth in forest plantations (tropical dry forests, North & South America, other broadleaf) of IPCC was assumed, taking into account an uncertainty deduction following GS guidelines. Based on the planting design and the distribution (%) of the species, an average biomass increment value per hectare was calculated for the project activities. See supporting document 'Emission reduction_GS11648_Ymbu' for more details on the calculation.				
Purpose of data	Calculation of project scenario				

Additional comment	
Data/parameter	Above-ground biomass growth for the planting design in 2023 & 2024
Unit	4.30 t.d.m./ha/year
Description	Average yearly above-ground biomass growth
Source of data	<p>(1)IPCC. (2019). 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories -CHAPTER 4 Forest land. Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, 4, 194. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf</p> <p>(2) Moura, O. N., Passos, M. A. A., Ferreira, R. L. C., Molica, S. G., Lira Junior, M. de A., Lira, M. de A., & Santos, M. V. F. dos. (2006). Distribuição de biomassa e nutrientes na área de Mimosa caesalpiniaefolia Benth. Revista Árvore, 30(6), 877-884. https://doi.org/10.1590/s0100-67622006000600002</p> <p>(3) Galdino da Silva, M. (2017). Crescimento, produção e distribuição de biomassa de espécies florestais em resposta ao método de cultivo. Universidade Federal Do Rio Grande Do Norte, 2, 19.</p> <p>(4) Drumond, M. A. (2013). Potencialidades de algumas espécies arbóreas madeireiras do bioma caatinga.</p> <p>(7) Pereira da costa, E. J. (2020). MUDANÇAS NA ESTRUTURA DA VEGETAÇÃO EM UMA ÁREA DE CAATINGA ENTRE 2015 E 2019.</p> <p>(8) Guerin, N. (2019). Potencial de plantios homogêneos de espécies nativas para catalisar a recuperação da biodiversidade e proporcionar o uso sustentável da Reserva legal. Universidade de São Paulo Escola Superior de Agricultura "Luiz de Queiroz".</p> <p>(10) Campos Filho, E. M., & Rodrigues Sartorelli, P. A. (2015). Guia de árvores com valor econômico. In Agroicone (Vol. 37, Issue 3).</p>

Value(s) applied	Native Species scientific names	Ratio	AGB growth (tdm/ha/year)	Source
	<i>Mimosa caesalpiniiifolia</i>	24%	7.35	(2), (3), (4)
	<i>Mimosa tenuiflora</i>	24%	3.00	(1)
	<i>Caesalpinia ferrea</i>	12%	3.00	(1)
	<i>Cenostigma pyramidale</i>	12%	3.00	(1)
	<i>Handroanthus heptaphyllus</i>	6%	2.85	(7), (8)
	<i>Anadenanthera macrocarpa</i>	6%	3.00	(1)
	<i>Astronium fraxinifolium</i> Schott.	6%	7.40	(10)
	<i>Myracrodruon urundeuva</i>	6%	2.72	(4)
	<i>Schinopsis brasiliensis</i>	3.0%	3.00	(1)
	Weighted average		4.30	
Choice of data or Measurement methods and procedures	<p>Due to a lack of primary data, the ex-ante estimation is based on species specific and international secondary data sources. For those species for which no species specific data was available, the default value for above-ground net biomass growth in forest plantations (tropical dry forests, North & South America, other broadleaf) of IPCC was assumed, taking into account an uncertainty deduction following GS guidelines.</p> <p>Based on the planting design and the distribution (%) of the species, an average biomass increment value per hectare was calculated for the project activities.</p> <p>See supporting document 'Emission reduction_GS11648_Ymbu' for more details on the calculation.</p>			
Purpose of data	Calculation of project scenario			
Additional comment				

Data/parameter	Wood density
Unit	g/cm ³
Description	The dry mass for a given volume of wood

Source of data	(4) Drumond, M. A. (2013). Potencialidades de algumas espécies arbóreas madeireiras do bioma caatinga. (12) Tannure Faria, J. C. (2012). Crescimento Inicial de espécies florestais em plantios mistos em alegre-es. Universidade federal do Santo Centro de ciências Agrárias (13) IPCC. (2006). Chapter 4 - Forest lands. IPPC Guidelines for National Greenhoue Gas Inventories, 4: Agricul(1-2), 125-140 https://doi.org/10.1016/0167-8809(92)90023-5 (15) ICRAF, Tree Functional Attributes and Ecological database		
Value(s) applied			
	Scientific name	Wood density	Source
	<i>Mimosa caesalpiniiifolia</i>	0.86	(4)
	<i>Caesalpinia ferrea</i>	1.12	(12)
	<i>Mimosa verrucosa</i>	1.12	(15)
	<i>Cenostigma pyramidale</i>	0.96	(15)
	<i>Anadenathera macrocarpa</i>	0.86	(13)
	<i>Enterolobium contortisiliquum</i>	0.3973	(15)
	<i>Guazuma ulmifolia</i>	0.5273	(13)
	<i>Handroanthus heptaphyllus</i>	0.985	(10)
	<i>Erythrina velutina</i>	0.23	(13)
	<i>Aspidosperma pyrifolium</i>	0.79	(15)
	<i>Ceiba glaziovii</i>	0.59	(15)
	<i>Amburana cearensis</i>	0.43	(13)
	<i>Commiphora leptophloeos</i>	0.43	(15)
	<i>Myracrodruon urundeuva</i>	1.21	(10)
	<i>Dalbergia cearensis</i>	0.73	(14)
	<i>Mimosa tenuiflora</i>	1.21	(15)
	<i>Astronium fraxinifolium</i> Schott.	1.05	(10)
	<i>Schinopsis brasiliensis</i>	1.23	(15)
<i>Aspidosperma ulei</i>	0.75	(15)	
<i>Cordia goeldiana</i>	0.48	(13)	

Choice of data or Measurement methods and procedures	Wood density is usually estimated based on secondary data as measurement is expensive.
Purpose of data	Calculation of project scenario
Additional comment	

Data/parameter	Biomass expansion factor (BEF)
Unit	tonnes d.m./m ³ wood volume
Description	It is the ratio between the mass of dry wood divided by its volume
Source of data	IPCC (2003). "Good Practice Guidance for Land Use, Land-Use Change and Forestry" Table 3A.1.10 Chapter 3 p. 3.178 - Tropical broadleaf
Value(s) applied	1.5
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of project scenario
Additional comment	

Data/parameter	Root-to-shoot ratio (R)
Unit	Dimensionless
Description	Ratio of below-ground biomass to aboveground biomass
Source of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Table 4.4 (updated) – Tropical dry, North and South America
Value(s) applied	0.334
Choice of data or Measurement methods and procedures	Belowground is usually estimated with a default factor as sampling is destructive and expensive
Purpose of data	Calculation of baseline and project scenario
Additional comment	

Data/parameter	Carbon fraction (CF) for 'tree biomass'
Unit	Tonne C/tonne d.m.
Description	Percentage of the biomass of the tree that is carbon
Source of data	Gold Standard Afforestation/Reforestation (A/R) GHG Emission Reduction & Sequestration Methodology, Version 1 – Published July 2017
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of project scenario
Additional comment	

Data/parameter	C to CO ₂ e
Unit	tCO ₂ /tC
Description	Factor applied to convert tree carbon sequestered to tree CO ₂ e
Source of data	Gold Standard Afforestation/Reforestation (A/R) GHG Emission Reduction & Sequestration Methodology, Version 1 – Published July 2017
Value(s) applied	44/12
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of project scenario and baseline scenario
Additional comment	

SDG 8

There are no fixed parameters for the indicators chosen for this SDG

SDG 15

There are no fixed parameters for the indicators chosen for this SDG

B.6.3 Ex ante estimation of SDG Impact

SDG 8

There is predicted to be 20 direct and 30 indirect jobs. The staff of Ymbu, the project implementation partner, are considered as permanent jobs, and indirect jobs are the seasonal workers:

Gold Standard

- 20 permanent full time jobs at Ymbu for the whole duration of the project
- 30 temporary full time jobs from January to June 2023, and January to June 2024, for planting and maintenance
- 10 Temporary part time jobs from July to December 2022, July to December 2023 and July to December 2024 for land preparation and after planting maintenance.
- After 2024, probably around 5 temporary workers for punctual fence/road maintenance, and possible forest maintenance.

SDG 13

Ex-ante carbon estimations were calculated following the Gold Standard Afforestation/Reforestation (A/R) GHG Emission Reduction & Sequestration Methodology, Version 1. The methodological steps are described briefly in section B.6.1. The detailed estimations can be found in the supporting document 'Emission reduction_GS11648_Ymbu'.

The ex ante of SDG 13 is calculated with the equation below:

$$CO_2\text{certificates} = (CO_2\text{fixation} - \text{Baseline} - \text{Leakage} - \text{Other Emissions}) * \text{Eligible planting area}$$

Year	Eligible area (ha)	CO ₂ -fixation (tCO _{2e} /year)	Baseline (tCO _{2e} /year)	Other emissions (tCO _{2e} /year)	CO ₂ certificates (tCO _{2e} /year)
04/04/2022 - 31/12/2022	32.7	0	919.60		-920
01/01/2023 - 31/12/2023	120.0	368	3,374.80		-3,007
01/01/2024 - 31/12/2024	497.1	1,630	13,980.40		-12,350
01/01/2025 - 31/12/2025		6,858			6,858
01/01/2026 - 31/12/2026		6,858			6,858
01/01/2027 - 31/12/2027		6,858			6,858
01/01/2028 - 31/12/2028		6,858			6,858
01/01/2029 - 31/12/2029		6,858			6,858
01/01/2030 - 31/12/2030		6,858			6,858

01/01/2031 - 31/12/2031		6,858			6,858
01/01/2032 - 31/12/2032		6,830			6,830
01/01/2033 - 31/12/2033		6,797			6,797
01/01/2034 - 31/12/2034		6,604			6,604
01/01/2035 - 31/12/2035		6,858			6,858
01/01/2036 - 31/12/2036		6,858			6,858
01/01/2037 - 31/12/2037		6,858			6,858
01/01/2038 - 31/12/2038		6,858			6,858
01/01/2039 - 31/12/2039		6,858			6,858
01/01/2040 - 31/12/2040		6,858			6,858
01/01/2041 - 31/12/2041		6,858			6,858
01/01/2042 - 31/12/2042		6,858			6,858
01/01/2043 - 31/12/2043		6,858			6,858
01/01/2044 - 31/12/2044		6,858			6,858
01/01/2045 - 31/12/2045		6,858			6,858
01/01/2046 - 31/12/2046		6,858			6,858
01/01/2047 - 31/12/2047		6,858			6,858
01/01/2048 - 31/12/2048		6,858			6,858
01/01/2049 - 31/12/2049		6,858			6,858
01/01/2050 - 31/12/2050		6,858			6,858
01/01/2051 - 31/12/2051		6,858			6,858

01/01/2052 - 31/12/2052		6,858			6,858
01/01/2053 - 31/12/2053		6,858			6,858
01/01/2054 - 31/12/2054		6,858			6,858
01/01/2055 - 31/12/2055		6,858			6,858
Total	649.8	214,254	18,274.8	0	195,979.2

SDG 15

As all species included in the project are native species, this estimate corresponds to the total planted area, namely 649.8 hectares.

B.6.4 Summary of ex ante estimates of each SDG Impact

SDG 8

The SDG outcome corresponding to SDG 8 will be reported during the next stages, when the project activities are fully implemented (the ex-ante estimations are included under section B.6.1 and B.6.3). In this case, the baseline scenario of SDG 8 is accounted as zero, since without the implementation of the project activities there would be no job creation in the project area.

SDG 13

Year	Baseline estimate	Project estimate	Net benefit	Annual tCO _{2e} (incl. buffer of 20%)
04/04/2022 - 31/12/2022	919.60	0	-920	-920
01/01/2023 - 31/12/2023	3,374.80	368	-3.007	-3.007
01/01/2024 - 31/12/2024	13,980.40	1,630	-12.350	-12.350
01/01/2025 - 31/12/2025		6,858	6.858	5.486
01/01/2026 - 31/12/2026		6,858	6.858	5.486
01/01/2027 - 31/12/2027		6,858	6.858	5.486
01/01/2028 - 31/12/2028		6,858	6.858	5.486

01/01/2029 - 31/12/2029		6,858	6.858	5.486
01/01/2030 - 31/12/2030		6,858	6.858	5.486
01/01/2031 - 31/12/2031		6,858	6.858	5.486
01/01/2032 - 31/12/2032		6,830	6.830	5.464
01/01/2033 - 31/12/2033		6,797	6.797	5.437
01/01/2034 - 31/12/2034		6,604	6.604	5.283
01/01/2035 - 31/12/2035		6,858	6.858	5.486
01/01/2036 - 31/12/2036		6,858	6.858	5.486
01/01/2037 - 31/12/2037		6,858	6.858	5.486
01/01/2038 - 31/12/2038		6,858	6.858	5.486
01/01/2039 - 31/12/2039		6,858	6.858	5.486
01/01/2040 - 31/12/2040		6,858	6.858	5.486
01/01/2041 - 31/12/2041		6,858	6.858	5.486
01/01/2042 - 31/12/2042		6,858	6.858	5.486
01/01/2043 - 31/12/2043		6,858	6.858	5.486
01/01/2044 - 31/12/2044		6,858	6.858	5.486
01/01/2045 - 31/12/2045		6,858	6.858	5.486
01/01/2046 - 31/12/2046		6,858	6.858	5.486
01/01/2047 - 31/12/2047		6,858	6.858	5.486
01/01/2048 - 31/12/2048		6,858	6.858	5.486
01/01/2049 - 31/12/2049		6,858	6.858	5.486
01/01/2050 - 31/12/2050		6,858	6.858	5.486

01/01/2051 - 31/12/2051		6,858	6.858	5.486
01/01/2052 - 31/12/2052		6,858	6.858	5.486
01/01/2053 - 31/12/2053		6,858	6.858	5.486
01/01/2054 - 31/12/2054		6,858	6.858	5.486
01/01/2055 - 31/12/2055		6,858	6.858	5.486
Total	18,274.80	214,254.0	195,979.20	153,528.0
Total number of crediting years	34 years			
Annual average over the crediting period	525.9	6,492	5,966	4,516

SDG 15

The SDG outcome corresponding to SDG 15 will be reported during the next stages, when the project activities are fully implemented (the ex-ante estimations are included under section B.6.1 and B.6.3). In this case, the baseline scenario of SDG 15 is accounted as zero, since without the implementation of the project activities there would be no planted areas with native species.

B.7. Monitoring plan

B.7.1 Data and parameters to be monitored

SDG 13

Data / Parameter	A_i
Unit	Ha
Description	Area of stratum I
Source of data	Field measurement
Value(s) applied	N/A
Measurement methods and procedures	Boundaries of planted areas are registered with GPS and imported into GIS software where additional attributes are added (date of plantation, plantation densities...), where surfacer are calculated using function implemented in GIS
Monitoring frequency	The surfaces of strata will be continuously updated based on plantation activities and silvicultural interventions.
QA/QC procedures	N/A

Gold Standard

Purpose of data	Calculation of project scenario
Additional comment	

Data / Parameter	DBH
Unit	Cm
Description	Tree diameter at breast-height (1.30m)
Source of data	Field measurement – Forest inventory
Value(s) applied	N/A
Measurement methods and procedures	The DBH will be measured, using standard inventory instruments such as diameter tapes.
Monitoring frequency	Every performance certification
QA/QC procedures	10% of the plots will be cross-checked by forest engineers of the project
Purpose of data	Calculation of project scenario – to be used in allometric equation for the calculation of above ground biomass
Additional comment	

Data / Parameter	H
Unit	M
Description	Total tree height
Source of data	Field measurement
Value(s) applied	N/A
Measurement methods and procedures	The height will be measured using standard inventory instruments such as clinometer.
Monitoring frequency	Every performance certification
QA/QC procedures	10% of the plots will be cross-checked by forest engineers of the project
Purpose of data	Calculation of project scenario – to be used in allometric equation for the calculation of above ground biomass
Additional comment	

Data / Parameter	Fj (x1, x2,x3)
Unit	

Description	Allometric equation: function relating measured tree dimensions (x1, x2, x3,...) to above-ground biomass
Source of data	scientifically published and peer-reviewed allometric equations, applicable to the project area (ecological conditions, species/genus) and used by other project entities in the region or national authorities
Value(s) applied	To be defined
Measurement methods and procedures	Screening scientific progress on this issue and use of allometric equations in similar projects / national authorities.
Monitoring frequency	Every performance certification
QA/QC procedures	
Purpose of data	Calculation of project scenario
Additional comment	

SDG 8

Data / Parameter	Increased employment opportunities
Unit	Number
Description	Total number of jobs -permanent and temporary jobs -full-time and part-time jobs
Source of data	Number of contracts
Value(s) applied	To be determined annually, after the design certification
Measurement methods and procedures	A database will be created with all employees' records
Monitoring frequency	Annually
QA/QC procedures	
Purpose of data	Contribution to SDG 8
Additional comment	It will be also checked whether the employees earn above the local minimum wage

SDG 15

Data / Parameter	Enhanced biodiversity
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Unit	Number of planted native trees and total number of planted trees Number of thinned sabia trees
Description	The number of type of planted native trees in the project area and the total number of planted trees Number of thinned sabia poles
Source of data	Project records
Value(s) applied	Up to 15 to 18 planted trees out of which all are expected to be native trees. It is expected that around 20% to 30% of all sabia poles will be thinned out during the crediting period.
Measurement methods and procedures	Counting of planted native trees and total number of planted trees
Monitoring frequency	Annual
QA/QC procedures	Not applicable
Purpose of data	Contribution to SDG 15
Additional comment	As per the Bern convention from 1979 ¹⁷ , native tree species are defined as species that have been observed in the form of a naturally occurring and self-sustaining population in historical times.

B.7.2 Sampling plan

SDG 8

No sampling plan required because there will be project records like contracts, payment slips, employee list or others available to check on the positive contribution to SDG 8.

SDG 13

Forest inventories will be organized for each performance certification to measure and monitor changes in forest carbon stocks. The design of the inventories will follow the Carbon Fix Guidelines referred to in the GS A/R requirements.

A plot type and size will be defined in consultation with the forest technicians.

¹⁷ <https://www.biodiversitya-z.org/content/native-species>

Number of sample plots

The number of sampling plots (n) for the forest inventory will be determined at the time of the 1st performance certification needed for achieving the 90/20 confidence/precision as prescribed in the Gold Standard A/R requirements. It will be estimated using following equation¹⁸:

$$n = \frac{(\sum_{h=1}^L N_h * s_h)^2}{\frac{N^2 * E^2}{t^2} + (\sum_{h=1}^L N_h * s_h^2)}$$

Where:

- E = allowable error or the desired half-width of the confidence interval. Calculated by multiplying the mean carbon stock by the desired precision (that is, mean carbon stock x 0.1, for 10 percent precision, or 0.2 for 20 per cent precision),
- t = the sample statistic from the t-distribution for the 95 per cent confidence level
- N_h = number of sampling units for stratum h (= area of stratum in hectares or area of the plot in hectares),
- n = number of sampling units in the population
- s_h = standard deviation of stratum h.

The maximum allowable error according to the Gold Standard is 20%. If a greater error is obtained, a discount will be made in the total carbon credits generated by the project according as established in the Gold Standard Afforestation/Reforestation (A/R) GHG Emissions Reduction & Sequestration Methodology.

Location of plots

The plots will be randomly selected without bias with a grid layer on QGIS. The plot locations will be identified with the help of the Global Positioning System (GPS) device in the field. For each plot

the geographic position (GPS coordinates), administrative location and stratum code will be recorded and archived. The plots will be established before any monitoring takes place. A Standard Operation Procedure (SOP) will be used to make sure the measurements are consistent throughout different teams.

Field measurements

A forest inventory protocol will be developed that specifies how to carry out dendrological measurements. On the field, the diameter at breast height (DBH) and height of the trees will be measured.

Field data collection template

¹⁸ Pearson, T., Walker, S., & Brown, S. (2005). Sourcebook for land use, land-use change and forestry projects. Winrock International and the BioCarbon Fund of the World Bank, 57.

Data collected in the field will be written on paper, using data collection templates. After returning from the field the data will immediately be entered into the computer (Excel Spreadsheet).

SDG 15

No sampling required. Since records about the number of trees and number of native trees are available.

B.7.3 Other elements of monitoring plan

Organization of monitoring

An Operational and management structure for monitoring, provisions for data archiving and responsibilities and institutional arrangements for data collection and archiving will be compiled.

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1 Start date of project

The start date, as defined by the 'Gold Standard Land Use & Forestry Activity Requirements, version 1.2.1', is the date when the first trees are planted, which is 04/04/2022.

C.1.2 Expected operational lifetime of project

>>34 years

C.2. Crediting period of project

C.2.1 Start date of crediting period

04/04/2022

C.2.2 Total length of crediting period

34 years

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1 Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in [Appendix 1](#), ongoing monitoring is summarised below.

Principles	Mitigation Measures added to the Monitoring Plan
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As per the complete Safeguarding Principles Assessment done in Appendix 1, none of the principles is relevant to the project or are potentially relevant to the project. None of them needs any mitigation measures to be monitored. Based on the assessment questions and taking into account the project context, one comes to the conclusion that no expert stakeholder opinion is needed

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	The Project takes into account gender roles and the abilities of women and men to participate in the decision/designs of the project activities. For example, the stakeholder consultation in the project design phase includes both women and men participating in the consultation meeting
Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	The project activity doesn't endorse any form of discrimination based on gender. Brazil has ratified ILO Conventions 100 (Equal Remuneration Convention) and 111 (Discrimination (Employment and occupation) convention) ¹⁹ . Women can participate to the project and will therefore not put at risk women's access to or control of resources or benefits. As per the Brazilian constitution and several laws, the project activity does not endorse any form of discrimination based on gender. ²⁰
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	An expert is not needed since gender is adequately addressed in the safeguarding principles assessment.
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	The Gold Standard Stakeholder Consultation & Engagement Procedure, Requirements & Guidelines was consulted and applied during the different stages of the local stakeholder

¹⁹

https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102571

²⁰ <https://www2.senado.leg.br/bdsf/bitstream/handle/id/159/10.pdf?sequence=4&isAllowed=y>
<https://examedaoab.jusbrasil.com.br/noticias/417266495/conheca-5-leis-feitas-exclusivamente-para-as-mulheres/amp>

consultation, preparation, invitation, meeting, feedback round. The detailed development and evidence of the local stakeholder consultation is presented in the LSC report. Sufficient attention was paid in the invitation process of the stakeholder consultation to invite both men and women in an equal manner.

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

The below is a summary of the 2 step GS4GG Consultation for monitoring purposes. Please refer to the separate Stakeholder Consultation Report for a complete report on the initial consultation and stakeholder feedback round.

E.1 Summary of stakeholder mitigation measures

Not applicable as no major concerns were raised by stakeholders for which the proposition of mitigation measures was needed

E.2 Final continuous input / grievance mechanism

Method	Include all details of Chosen Method (s) so that they may be understood and, where relevant, used by readers.
Continuous Input / Grievance Expression Process Book (mandatory)	Grievance process book is available at the office of Ymbu Agroflorestal Ymbu Agroflorestal – Sede Fazenda Pelada S/N Zona Rural Caridade – CE 62730-000 Brazil
GS Contact (mandatory)	help@goldstandard.org
Telephone (optional)	Mathias Lessman +55 85 9.9994-8900
Internet/email (optional)	contato@ymbuagroflorestal.com.br

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into [SECTION D](#) above. Please refer to the instructions in the [Guide to Completing](#) this Form.

Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
<p>1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights</p> <p>2. The Project shall not discriminate with regards to participation and inclusion</p>	Yes	<p>1. The project follows all human rights as defined in the Universal Declaration of Human Rights.²¹ Brazil has ratified many UN Human Rights conventions.²²</p> <p>The project respects the rights of employees and the employees have the right to raise their grievance.</p> <p>Furthermore the project is in line with both Brazilian and international legislation regarding human rights.</p>	N/A

²¹ <https://www.un.org/en/about-us/universal-declaration-of-human-rights>

²² https://tbinternet.ohchr.org/_layouts/15/TreatyBodyExternal/Treaty.aspx?CountryID=41&Lang=EN

		2.Participation in the project (e.g. in form of employment) is open to anyone in the area without discrimination of gender, religion or sexual orientation. So far, no cases of discrimination have been identified.	
Principle 2. Gender Equality			
<p>1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women</p> <p>2. Projects shall apply the principles of nondiscrimination, equal treatment, and equal pay for equal work</p> <p>3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks</p>	Yes	<p>1. The project will not restrict women's rights or access to natural resources. It will not have any impact on women's ownership rights to inherit and own land, homes and other assets.</p> <p>2. The Project applies the principles of non discrimination and equal treatment.</p> <p>For any other eventual paid or volunteer work the principle of the equal pay for equal work will be applied and organized in a way to provide the</p>	N/A

4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)		<p>conditions for equitable participation of men and women. There are no limitations on participation or benefiting from the Project depending on the pregnancy, maternity/paternity leave or marital status.</p> <p>3. As per the Brazilian constitution and several laws, the project activity does not endorse any form of discrimination based on gender.²³</p> <p>4. Not applicable</p>	
Principle 3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the	Yes	The project activity does not expose the community to increased health risks and is not adversely affecting the health of the workers and the community.	N/A

²³ <https://www2.senado.leg.br/bdsf/bitstream/handle/id/159/10.pdf?sequence=4&isAllowed=y>
<https://examedaoab.jusbrasil.com.br/noticias/417266495/conheca-5-leis-feitas-exclusivamente-para-as-mulheres/amp>

workers and the community		More in general, Ymbu follows the national regulation of Brazil on health, safety and working conditions.	
Principle 4.1 Sites of Cultural and Historical Heritage			
Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture?	No Project area is located on private land, which is being leased for a period of 34 years (see land lease agreement) from the rightful owner, who holds the land registration documents. The purpose mentioned in the land lease agreement corresponds to reforestation activities.	N/A	N/A
>>			
Principle 4.2 Forced Eviction and Displacement			
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No There are no indigenous people present in the project area. The project area is located on private land which is not claimed by indigenous people.	N/A	N/A
>>			

Principle 4.3 Land Tenure and Other Rights			
<p>a. Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership?</p> <p>b. For Projects involving land use tenure, are there any uncertainties with regards to land tenure, access rights, usage rights or land ownership?</p>	<p>No</p> <p>Project area is located on private land, which is being leased for a period of 34 years (see land lease agreement) from the rightful owner, who holds the land registration documents. The purpose mentioned in the land lease agreement corresponds to reforestation activities.</p>	<p>N/A</p>	<p>N/A</p>
>>			
Principle 4.4 - Indigenous people			
<p>Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?</p>	<p>No</p> <p>There are no indigenous people present in the project area. The project area is located on private land which is not claimed by indigenous people.</p>	<p>N/A</p>	<p>N/A</p>
>>			
Principle 5. Corruption			

1. The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	Yes	The project shall not contribute or reinforce corruption. It is guaranteed by Ymbu that there is not any violation of the Anti-Corruption Regulations and the same is re-enforced in the contract with Fortunat. Brazil has signed the OECD anti-bribery convention with is followed by all involved Parties. ²⁴	N/A
Principle 6.1 Labour Rights			
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions	Yes	1. The project does not involve and is not complicit in any form of forced or compulsory labour. All labour is voluntary and Ymbu does not engage in any form of forced, compulsory or child labour. There won't be any form of labour discrimination. Labour conditions for workers will be safe. This is as well defined in the contract between Ymbu	N/A

²⁴ <https://www.oecd.org/corruption/brazil-oecdanti-briberyconvention.htm>

<p>2. Workers shall be able to establish and join labour organisations</p> <p>3. Working agreements with all individual workers shall be documented and implemented and include:</p> <p>a) Working hours (must not exceed 48 hours per week on a regular basis), AND</p> <p>b) Duties and tasks, AND</p> <p>c) Remuneration (must include provision for payment of overtime), AND</p> <p>d) Modalities on health insurance, AND</p> <p>e) Modalities on termination of the contract with provision for voluntary resignation by employee, AND</p>		<p>and Fortunat. Brazil has ratified many ILO Conventions, amongst others convention 98 (Right to Organise and Collective Bargaining Convention).²⁵</p> <p>2. All workers in the project are free to join any labour organisation.</p> <p>3. The working agreements with the individual workers are documented and implemented and the minimum requirements stated in section 3.6.1 of GS4GG Safeguarding Principles & Requirements (version 1.1) are respected whenever applicable.</p> <p>4. All the possible staff hired by Ymbu has a minimum age of 18. No child labour is allowed in the project. Brazil has ratified ILO Conventions</p>	
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²⁵ https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102571

<p>f) Provision for annual leave of not less than 10 days per year, not including sick and casual leave.</p> <p>4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion)</p> <p>5. The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures</p>		<p>138 (Minimum Age Convention) and 182 (Worst Forms of Child Labour Convention).²⁶</p> <p>5. Trainings to staff are provided regularly. All work will be carried out by using appropriate equipment, documentation and reporting of accidents and incidents. A plan will be provided that describes the steps that must be followed how to respond on an incident.</p>	
Principle 6.2 Negative Economic Consequences			
<p>1. Does the project cause negative economic consequences during</p>	<p>No</p>	<p>N/A</p>	<p>N/A</p>

²⁶ https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102571

and after project implementation?	The cost for the implementation of the project activities are covered by the investment of Umicore, who finances the project in exchange for the carbon credits.		
>>			
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	N/A	N/A
>>	The previous land is shrubland and to a minor extent cropland. Therefore, the project will reduce the greenhouse gas emissions over the baseline scenario. The GHG net sequestration will be monitored and verified in line with the GS4GG.		
Principle 7.2 Energy Supply			
Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood,	No	N/A	N/A
	Only diesel is consumed in the machinery used for planting activities. No power		

biomass) that provides for other local users?	consumption from local grid is required to plant the trees.		
>>			
Principle 8.1 Impact on Natural Water Patterns/Flows			
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No The project will respect the existing watercourses. The presence of trees will improve the soil conditions and increase water infiltration.		
>>			
Principle 8.2 Erosion and/or Water Body Instability			
a. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? b. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?	No The planting of trees will help to prevent erosion. Planting on steep slopes (>45%) is avoided and planting on less steep slopes (between 15%-45%) is done manually in contour lines.	N/A	N/A
>>			

Principle 9.1 Landscape Modification and Soil			
Does the Project involve the use of land and soil for production of crops or other products?	No	N/A	N/A
>>	Leakage: Move people who planted crops inside to the adjacent area (gradual process). As mentioned above, there will be around 20 hectares foreseen for agricultural activities.		
Principle 9.2 Vulnerability to Natural Disaster			
Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No	N/A	N/A
>>	The project does not lead to an increased vulnerability to wind, earthquakes, landslides, erosion, flooding, drought or other extreme climatic conditions. On the contrary, the planting of trees will lead to decreased vulnerability to natural disasters.		
Principle 9.3 Genetic Resources			

Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?	No The project does not involve genetically modified organisms (GMOs).	N/A	N/A
>>			
Principle 9.4 Release of pollutants			
Could the Project potentially result in the release of pollutants to the environment?	No The preparation of the land and planting activities require the use of machinery which consumes diesel. The combustion of diesel however is not considered to be significant, hence can be neglected according to the GS A/R GHG Emissions Reduction & Sequestration Methodology.	N/A	N/A
>>			
Principle 9.5 Hazardous and Non-hazardous Waste			

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Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	No	N/A	N/A
>>	The tubes used for growing the seedlings are re-used. No other hazardous or non-hazardous chemicals and/or materials are used.		
Principle 9.6 Pesticides & Fertilisers			
Will the Project involve the application of pesticides and/or fertilisers?	No	N/A	N/A
>>	The project does not make use of any fertilizers or pesticides in the field. Only very insignificant quantities are used for the production of seedlings.		
Principle 9.7 Harvesting of Forests			
Will the Project involve the harvesting of forests?	Potentially	Since this is only a coppicing of certain poles, no negative impact is expected; on the contrary it will stimulate the growth of the other Sabia poles and other trees.	N/A
>>	The project will involve the harvesting of only one species, the Sabia tree. It will result in 300 to 500 wood poles per hectare.		
Principle 9.8 Food			

Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No	N/A	N/A
>>	The project does not modify the quantity or nutritional quality of food.		
Principle 9.9 Animal husbandry			
Will the Project involve animal husbandry?	Potentially	N/A	N/A
>>	It is not predicted to involve animal husbandry but goats/sheep could possibly be involved at a later stage for biomass/grass management of grasses (Serrapillera) grown between the trees.		
Principle 9.10 High Conservation Value Areas and Critical Habitats			
Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No,	N/A	N/A
>>	The project does not negatively affect or alter intact or HCV ecosystems, critical habitats, landscapes, key biodiversity areas.		

	On the contrary, the project will protect biodiversity through the conservation of natural habitats and enhancing habitat connectivity.		
Principle 9.11 Endangered Species			
<p>a. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)?</p> <p>b. Does the Project potentially impact other areas where endangered species may be present through transboundary affects?</p>	<p>No</p> <p>The project will not have any negative impact on endangered species. On the contrary, the project will create a more diverse and protected environment being more suitable for fauna (mammals etc). Besides, some of the species planted in the project are almost extinct.</p>	N/A	N/A
>>			

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	FORTUNAT Projetos Florestais Sociedade Unipessoal Limitada
Registration number with relevant authority	CNPJ (Federal Registration): 46.058.833/0001-04 I.E. (Inscrição Estadual): 07.057147-3
Street/P.O. Box	Fazenda Barra do Facao S/N, Zona Rural
Building	
City	Caridade
State/Region	Ceará
Postcode	62730-000
Country	Brazil
Telephone	+55 85 9.9994-8900
E-mail	contato@ymbuagroflorestal.com.br
Website	https://www.ymbuagroflorestal.com.br/
Contact person	Mathias Lessmann
Title	
Salutation	Mr.
Last name	Lessmann
Middle name	
First name	Mathias
Department	
Mobile	
Direct tel.	
Personal e-mail	

APPENDIX 3- LUF ADDITIONAL INFORMATION

Risk of change to the Project Area during Project Certification Period:	The project is developed on leased private land. There is as well a investment contract in exchange for the credits for 34 years, which minimizes the risk of change of the project area.
Risk of change to the Project activities during Project Certification Period:	The risks are very minor since the project has the buy-in from the land-owner and a contract has been signed for the lifetime of the project which does not allow any change to the project activities. The budget plan provides sufficient funding for the implementation of the project.
Land-use history and current status of Project Area:	Until the end of the 70s of the previous century, cotton was the main crop in the region. It was then, when it came to a drastic price collapse and pests attacking the cotton, which resulted in the end of that crop in the region. Subsequently some subsistence rotative farming (corn, beans) was practiced along with cattle grazing between August and December being fed from the remaining crops on the field. During the last decades a continuous deforestation took place and on the other hand no trees were planted. The current status of the project area is characterized by shrubland and to some minor extent cropland (around 50 ha).
Socio-Economic history:	<p>The Caatinga region in Ceara exhibits one of the lowest social and economic indexes of Brazil and extensive farming, imposed by the low and unpredictable net productivity of the Caatinga, has been causing a strong impact on vegetation.²⁷</p> <p>The decline of cotton resulted in quite a lots of migration to the cities like Fortaleza and made familied more and more dependent on government support ("bolsa familiar").</p>
Forest management applied (past and future)	<p>No management was carried out for the shrublands.</p> <p>On the minor cropland area, agricultural activities were carried out.</p>
Forest characteristics (including main tree species planted)	Mixed native plantations with 15 different species (in 2022) and 9 different species (in 2023) will be planted. The average plantation density is around 2,960 trees per hectare. For more details, see "Layout Plantios Carbono_V04_2023.pdf"
Main social impacts (risks and benefits)	The project will create both permanent and temporary jobs in the region which would not have been created in the absence of the project activity. In terms of risks, alternatives have to be found for those people who were practicing agriculture on the project area before (see section B6).

²⁷ Antongiovanni,M., Venticinque, E.M., Matsumoto, M., Fonseca, C.R. (2019). Chronic anthropogenic disturbance on Caatinga dry forest fragments. Journal of Applied Ecology.

Main environmental impacts (risks and benefits)	The project contributes to the enhancement of biodiversity through the planting of several species of native trees. It creates a bio-corridor to the existing remaining forest patches in the project area. It contributes to the mitigation of climate change. Since the carbon sequestration in the project scenario is significantly higher than that in the baseline scenario. In terms of risks, see the Risks and Capacities Assessment.
Financial structure	The project is being financed by an external investor, Umicore, in exchange for the carbon credits. Umicore provides up-front finance for the implementation of project, purchase of machines, ongoing costs of the project etc.
Infrastructure (roads/houses etc):	There is one small village with around 2 dozens of houses in the Western part of the project area. There are two roads going through the village as well as some smaller access roads.
Water bodies:	There are two water dams and some temporary water streams.
Sites with special significance for indigenous people and local communities - resulting from the Stakeholder Consultation:	None
Where indigenous people and local communities are situated:	None
Where indigenous people and local communities have legal rights, customary rights or sites with special cultural, ecological, economic, religious or spiritual significance:	None

APPENDIX 4-SUMMARY OF APPROVED DESIGN CHANGES

Please refer to Design Change [Requirements](#) for more information on procedures governing Design Changes

Revision History

Version	Date	Remarks
1.2	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Inclusion criteria table added Gender sensitive requirements added Prior consideration (1 yr rule) and Ongoing Financial Need added Safeguard Principles Assessment as annex and a new section to include applicable safeguards for clarity Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on Stakeholder Consultation information required Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1.0	10 July 2017	Initial adoption