FOREST CONSERVATION IN BOUMBA-ET-NGOKO (SECOND VERIFICATION)

Project title	Forest Conservation in Boumba-et-Ngoko
Project ID	2897
Monitoring period	01-January-2022 to 31-December-2023
Original date of issue	21-August-2024
Most recent date of issue	06-November-2024
Version	v9
VCS Standard Version	VCS Standard v4.7 (16 April 2024)
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Forest Conservation in Boumba-et-Ngoko Project (FCBN) is located in one of the most dense and important forest areas in Cameroon. It is a state-owned forest granted in concession for the exploitation of wood resources and is of great economic interest due to the presence of high-value timber species. Since 2002, this forest unit has been managed by UFA (LFB), a subsidiary company of Société d'Exploitation Forestière et Agricole du Cameroun (SEFAC). LFB harvested commercial timber from the forest area, following the terms of the Forest Management Plan (FMP, or *Plan d'Aménagement - PDA*) drawn up at the start of management of the concession. The forest concession in the *Unité Forestière d'Aménagement* (UFA) 10-064 was granted to LFB for timber production through selective logging. The FCBN project, through the implementation of the *VCS Improved Forest Management (IFM) - Logged to Protected Forest (LtPF)* methodology, aims to preserve a part of the forest concession from the exploitation of forest resources, which would have been used in the following years as foreseen in the documents approved by the Ministère des Forêts et de la Faune (MINFOF) - Ministry of Forests and Wildlife. The area that will be exempted from logging is approximately 44,413 ha, for an estimated volume of 1,908,025 m^3 of wood that will be exempted from logging. By the way, this area includes also temporary flooded areas, which cannot be considered in the project area: for this reason, the actual extension of the project area is 38,309 ha, including primary and secondary forest strata.

The project aims to stop planned logging activities, protect the forest, and avoid emissions generated by logging, transport, and processing of raw material as well as collateral damage to vegetation and biodiversity, decomposition of material left in the forest, construction of forest tracks for transport to the storage point, construction of hydraulic engineering works, construction of bridges and other infrastructure. Fauna in the project area will also benefit from the halt of logging activities, following reduced habitat fragmentation and less disturbance related to machinery activities. Thanks to the absence of commercial forest logging, the forest will be able to store carbon through the conservation of trees over the longevity period covered by the project, as well as avoid the emissions from wood harvesting, processing and production. The monitoring activities are aimed at checking the data reported on the document at the project planning stage. The data collected are therefore intended to confirm the accuracy of what has been reported, both in terms of the data concerning the physical nature of the site and the estimates made through what has been observed by the surveys.

In the current monitoring period (2022-2023, - 1st January 2022 to 31st of December 2023), the annual logging portions (*Assiette Annuel de Coupe*, AAC) 5-1 and 5-2 would have been logged under the baseline scenario, following the UFA 10-064 forest management plan.

However, these logging areas were maintained intact in the project scenario, with no logging activities. The other AACs included in the project areas (4-2 to 4-5, and 5-3 to 6-5) have also been monitored during this period for illegal logging and natural disturbances. All the AACs included in the project area (4-2 to 6-5) would have been logged in the baseline scenario, as for the UFA 10-064 Forest Management Plan (2005). These AACs were not logged in this project scenario, and no forest infrastructure (logging trails, secondary routes, etc.) was implemented in the UFA 10-064 during the monitoring period. The project proponent (Carbonsink Group S.r.l., CSG) and the project implementer (Filière Bois, LFB) collaborated for the realization of this monitoring plan. They conducted the monitoring as presented in Section 4.3 of this document. LFB, through the SEFAC monitoring team and the active participation of the local communities and authorities (forestal ranger, local police, etc...) is in charge of the monitoring of disturbances that could occur in the project area (fire, poaching, pest, and disease outbreaks and illegal logging). Mitigation actions are implemented, such as refreshing the forest boundaries, patrolling against illegal activities inside UFAs, and controlling access to the barriers of the UFA, aimed at minimizing the risk of illegal activities. LFB also implemented communication actions with the stakeholders of the project, in particular through local consultation. CSG is responsible for the provision of evidence regarding activity shifting leakage and market leakage. From the implementation of the project, it is estimated that an *ex-ante* net average of 325,885 tons of GHG emissions will be avoided from entering the atmosphere annually and a net total of 5,538,682 tons of GHG emissions will be avoided through the 20 years of implementation of the project. The total GHG emission reductions and carbon dioxide removals generated in the current monitoring period (2022-2023) are 362,811 tons of CO_2eq.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation/ verification	01-January-2018 – 31-December-2021	VCS	AENOR	Four years
Second Verification	01-January-2022 – 31-December-2023	VCS	Earthood	Two years

1.3 Sectoral Scope and Project Type

Sectoral scope	VCS sectoral scope 14 – Agriculture, Forestry and Other Land Uses (AFOLU)

AFOLU project category[1]	Improved Forest Management (IFM)
Project activity type	Conversion from Logged Forest to Protected Forest (LtPF)

1.4 Project Proponent

Organization name	Carbonsink Group S.r.l.
Contact person	Tania Cencetti
Title	Senior Manager NBS Project
Address	Piazza Giulio Beverini, 4, 19121 La Spezia (SP) – Italy
Telephone	+39 055 9361169
Email	tania.cencetti@carbonsink.it

1.5 Other Entities Involved in the Project

Organization name	La Filière Bois (LFB)
Role in the project	Project Implementer on the field, entity that holds the forest concession
Contact person	Angelo Piazzalunga
Title	Head of Certification
Address	146-148 Rue des Écoles – Postal Box: 942 Douala, République du Cameroun
Telephone	+39 349 3935299
Email	piazzalunga@groupesefac.com

[1] *See Appendix 1 of the* VCS Standard

1.6 Project Start Date

Project start date	01-January-2018
Justification	The project has a start date of 01-January-2018. This date corresponds to the stop of LFB's logging activities in the UFA 10-064 forest concession. The cessation of activities was confirmed by the certificates issued by the Cameroonian Ministry of Forestry (MINFOF)[2].

1.7 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☐ Ten years, fixed ☒ Other (The crediting period started from the cessation of logging operations. This period is aligned with the requirements presented in the *VCS Standard v4.7*, as stated in Section 3.9.3 which sets 20 years as a minimum crediting period. As set in Section 3.9.4 (*VCS Standard v4.7*), the implementation of activities is regulated by a monitoring plan).
Start and end date of first or fixed crediting period	01-January-2018 to 31-December-2037

1.8 Project Location

The Forest Conservation in Boumba-et-Ngoko Project is located in the Moloundou district, Boumba-et-Ngoko department, in the East Region of the Republic of Cameroon. The project activity is located inside UFA 10-064 (Figure 1).

[2] Supporting Information/Attestation de Non Activité

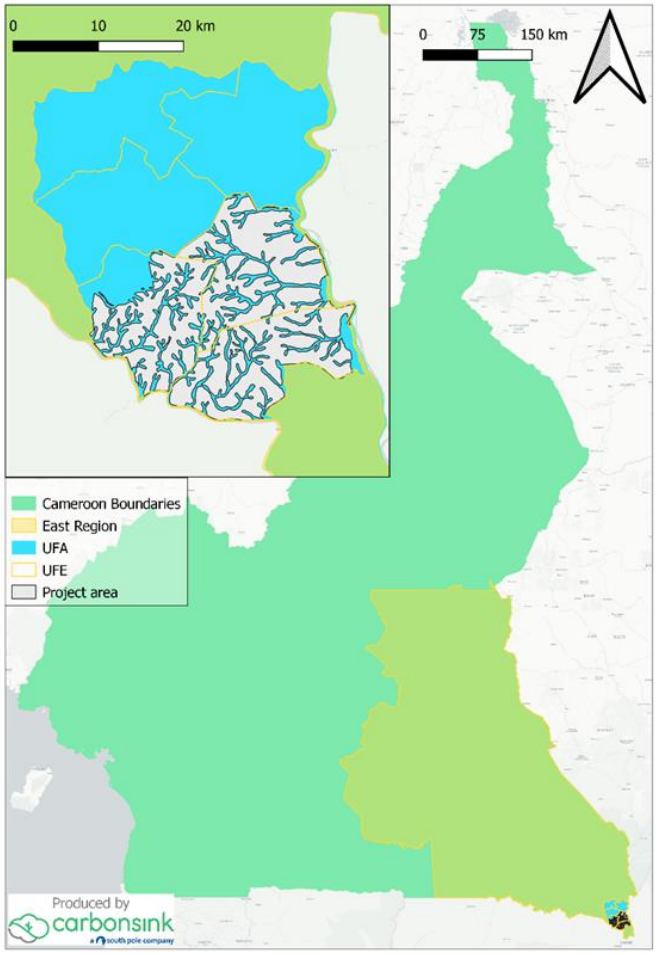

Figure 1: Localization of the project area inside the Cameroon

This forest area borders the north with the Lobéké National Park, the east with the Sangha River, (the natural border between the Republic of Cameroon and the Republic of Congo), the south with the Ngoko River, and the west with UFA 10-063 (this forest concession has never been exploited since its allocation in 2015). LFB is the concessionaire of the entire project area and has the legal right to control and operate in the project area via the forest concession attribution (Decree 2012/1001/PM, 10 Avril 2012). Before the implementation of the project, the forest concession was logged annually according to the timber harvest plan redacted in 2005. During the exploitation of forest resources, various infrastructures were created to allow wood extraction throughout the river. The total project area set aside for conversion from logged-to-protected forest is 38,309 ha of productive forest (44‘413 ha of productive forest, including the temporary flooded areas, which were excluded from the project area but will also be exempted from logging activities during the entire project longevity). The project area surface corresponds approximately to 33% of the total UFA 10-064 surface, including a part of UFE 4 (from AAC 4-2 to AAC 4-5) and the entire UFE 5 and UFE 6 (Figure 2).

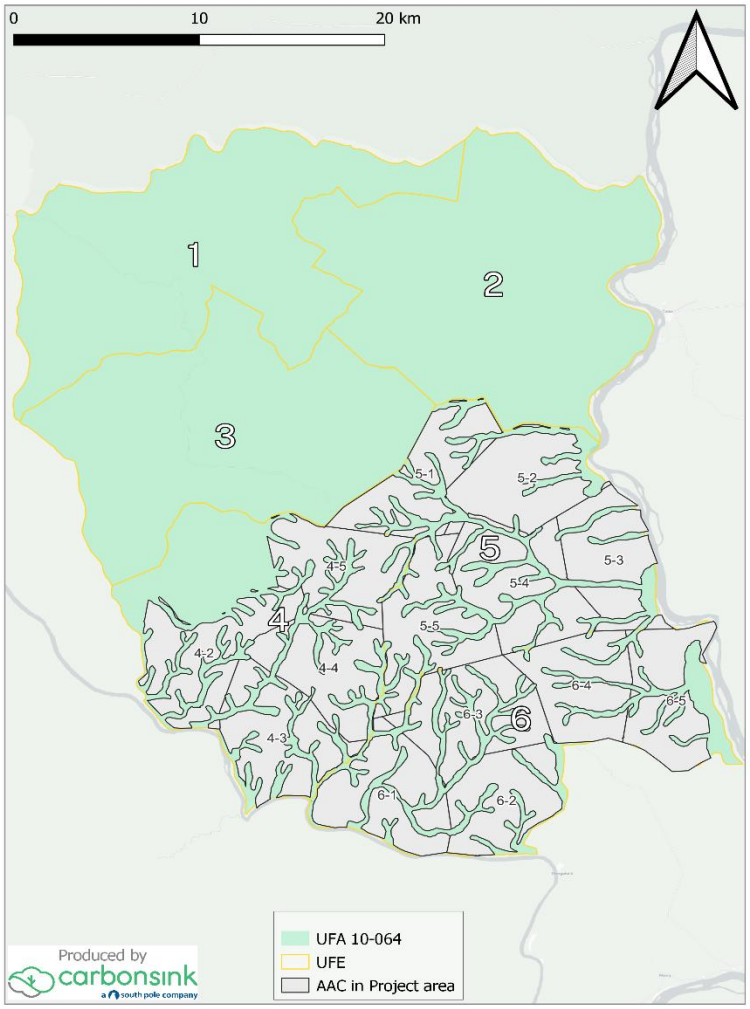

Figure 2: Annual Logging Areas (AACs) included in the project

The project area excludes wetlands areas, mandatory protected by Cameroonian forestry laws. Permanently and temporarily flooded areas and those crossed by the river flows were conservatively excluded from the project area, to match the eligibility criteria of the VCS VM0010 methodology v1.3. The geographic coordinates of each block included are available separately in .kmz and .shp files[3].

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	VM0010	VM0010 Methodology for Improved Forest Management:	1.3

[3] Supporting Information/Spatial Information

		Conversion from Logged to Protected Forest	
Tool	VCS tool VT0001	VCS tool VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities	3.0
Tool	NPRT	VCS AFOLU Non-Permanence Risk Tool	4.2

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

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

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

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

☐ Yes ☒ No

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

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

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

☐ Yes ☒ No

This project will only generate net GHG emission reductions on an additional and voluntary basis; there are no ongoing emissions trading programs in the Republic of Cameroon. Moreover, being a developing country, Cameroon has no binding limits on GHG emissions or compliance requirements under international multilateral agreements. GHG removals generated by this project will not be used for compliance with binding limits to GHG emissions since such limits are not enforced in the country.

1.11.2 No Double Claiming with Other Forms of Environmental Credit

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

☐ Yes ☒ No

The present project has not sought or received another form of GHG-related environmental credits, including renewable energy certificates.

1.11.3 Supply Chain (Scope 3) Emissions

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

☐ Yes ☒ No

1.12 Sustainable Development Contributions

Monitoring of the project area is carried out through several joint activities:

- Forest access control;
- illegal activity (illegal logging and poaching) and natural risks monitoring;
- forest concession borders' maintenance and refreshing;
- GIS remote monitoring.

Field activities are carried out by the LFB monitoring team, the Socambo and Mongokélé village committee, the local law enforcement officers, and the anti-poaching team (BIM, in collaboration with the *Comité de Vigilance Anti Braconnage*, COVILAB).

GIS monitoring activities are carried out through remote sensing and forest cover analysis by the CSG team. Remote sensing analyses are combined with on-the-ground data to determine illegal activities and forest fires happening inside the project area. These remote sensing activities include:

- Identification of potential illegally logged areas: cartographic information is used from the supervised classification of satellite images of Sentinel-2A (2022-2023) to identify Forest and Non-Forest areas (see Section 4.3 for more accurate information). This analysis helps to track the project's progress toward sustainable forest management (SDG Target 15.2.1);
- Area burned during the second verification: For that an analysis was carried out using MODIS MCD64A1 Version 6.1 Burned Area product data for the monitored period

(2022-2023), and in-situ monitoring reports (see Section 4.3 for more accurate information).). These calculations are carried out to accurately assess the tons of greenhouse gas emissions avoided or removed (SD contribution to Target 13.0)-

The illegal logging and wildfires data was used for SDG target 13 ('Tons of greenhouse gas emissions avoided or removed') because illegal logging and wildfires were used for the calculations by reducing the number of tons of CO2 not emitted to the atmosphere. Therefore this parameter obtained from remote sensing has been used for the final estimation of CO2 not released to the atmosphere (see Section 5.2). Moreover, the geographical project boundaries and stratification were designed using remote sensing data (from the project area shapefiles). These delimitations allowed the project to define quantitative areas (in hectares) for monitoring SDG 15.1.1 ('Forest area as a proportion of total land area') and to define the progress toward forest sustainable management (SDG Target 15.2.1).

The cessation of logging activities and the implementation of monitoring activities make it possible to avoid emissions from industrial exploitation of forest resources and illegal logging, as well as from natural disturbance, which is tracked by SDG Target 13.0. These objectives are in line with the goals jointly set by the Cameroonian Government and the UN, presented in the 'UN Sustainable Development Cooperation Framework for Cameroon 2022 to 2026' document (November 2021)[4].

[4] https://unsdg.un.org/resources/un-sustainable-development-cooperation-framework-cameroon-2022-2026

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	13.0	Tons of greenhouse gas emissions avoided or removed	Implemented activities to increase with respect to the baseline scenario	By preserving around 44'000 ha of 'productive' tropical moist dense forest[5] (including the AAC 5-1 and 5-2, which would have been exploited during the monitoring period), this conservation project in the UFA 10-064 has prevented the release of about 360,000 tons CO_2e into the atmosphere during the monitoring period (2022-2023).	Prevented the release of 4,984,814 tons CO_2e (*ex-ante* estimation) into the atmosphere from 01-01-2018 to 31-12-2037[6]. The discrepancy concerning the registered PD ("*about 4,900,000 tons CO_2e*") is related to the clarification of the total emission avoided from the project as calculated *ex-ante*.

[5] The total project area for conversion to logged-to-protected forest is 38,309 ha of 'productive' forest. However, the temporarily flooded areas are also exempted from logging during the entire project longevity, adding up to 44'413 ha of protected forest. The PP provided a shapefile to VVB and Standard for reference.

[6] Ex-ante calculations are provided to the VVB and Standard for consultation.

2)	15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	15.1.1 Forest area as a proportion of total land area	Implemented activities to increase with respect to the baseline scenario	100% of the project area for the monitoring period (about 13,500 ha) was not logged. Forest degradation from logging activities (including infrastructure and log trail development) was thus avoided during this monitoring period.	100% of the project area (about 38,309 ha, not including the areas with temporarily flooded forest stratum) will be preserved from logging activities and this has been active since the start date of the project (01-01-2018). This will help maintain the forest as intact as possible, by avoiding forest disturbances such as forestry infrastructures and stand damage from tree logging.

3)	15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	15.2.1 Progress towards sustainable forest management	Implemented activities to increase with respect to the baseline scenario	100% of the project area for the monitoring period (about 13,500 ha, considering the AAC 5-1 and 5-2 that would have been selectively logged in the baseline scenario) was not logged.	By avoiding logging, the impact of the forest manager will be minimal in the project area (only related to monitoring activities). The total project area (about 38,309 ha, (about 44,413 ha including also the areas that are not accounted for in carbon calculations) will be thus managed sustainably.

1.13 Commercially Sensitive Information

Information required by the VCS Standards is considered confidential or commercially sensitive and cannot be made public by the project proponent. This information will be supplied, in full, to the Auditor/Standard during the verification process, attached to the MR document, but is not included in the public version. In this monitoring report, no commercially sensitive information is present and has thus to be excluded from the public version of this monitoring report.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	Through years of activity in the region, LFB has built a strong network of relationships with local authorities, communities, and their representatives. As required by the Cameroonian forestry law[7], LFB carries out various social works with local communities[8] and provides medical and food supplies. Relations are maintained through participative meetings in which the inhabitants of the surrounding villages affected by the logging activities are involved. In these participative meetings, both the village chief and the representative of the Farmer Forestry Committees (*Comité Paysans Forêt*, CPF) are present, and the forest police (*chef de poste forestale*), customs and military authorities (*chef de géndarmerie*, BIM) also participate as fundamental governmental actors in the areas. In the specific case of the project area, the communities that are affected are those of the nearby settlements of Socambo and Mongokélé. These communities are located South of the UFA 10-064 forest concession boundaries. The project intends to make use of

[7] The Forest Code, No. 94/01 of 20 January 1994

[8] Supporting Information/sefac-proces-verbal-attestation-de-realisation-des-oeuvres-sociales…

this solid and already established dialogue structure[9] to optimize communication between the populations, the authorities, and the company on the progress of the project. The following stakeholders[10] were thus identified during the validation and first verification as influential on the project, based on the impacts that could have and get from the project. The stakeholder makeup has not changed since validation and first verification. Thus, they already participated in the first local stakeholder consultation held on 12 April 2022[11]:

- Local communities of Socambo and Mongokélé;
- Farmer-Forest Committee (CPF, *Comité Paysan Forêt*) of Socambo and Mongokélé. The CPF is an intermediary body between the local populations living in the forests of the permanent forest estate (FMUs, national parks, wildlife reserves, etc.) and all other players involved in the management of these forests. They're thus a fundamental actor involved in the project;
- Ministry of Forestry and Wildlife (MINFOF), represented by the local leader of the forestry (*chef de poste*, *garde forestier*);
- *Chef de poste de gendarmerie*, directly attached to Moloundou assistant divisional officer (*sous-prefect*);
- Border police authority (*police*);
- Head of BIM (Motorized Infantry Battalion) detachment in Socambo;
- Committee of Poaching Prevention (*Comité de Lutte Anti-Braconnage*, COVILAB).

9 See evidence on Supporting Information/ Previous Validation and Verification Documents /LSC 2022

10 Supporting Information\Previous Validation and Verification Documents\E.S.E 2005.pdf, and E.S.E 2004.pdf

11 See evidence on Supporting Information/ Previous Validation and Verification Documents /LSC 2022; see also the Validation and First Verification Report (2023), Section 2.2

Legal or customary tenure/access rights	The project area falls within the UFA 10-064, located in the southeastern part of Cameroon on the border with the Central African Republic and the Republic of Congo. LFB holds the exploitation rights for UFA 10-064[12], which were acquired by LFB from the *Ministère des Forêts et de la Faune* (MINFOF) through the order n°0974 of 20th November 2007 and the decree n°2012/1001 of 10th April 2012. The UFA Management Plan (2002-2031) is effective for 30 years; the logging plan was applied until 2018 by LFB, which is the concessionaire for the area having the legal right to control and operate in the project area. In 2018, LFB halted logging in the project area to implement the "Forest Conservation in Boumba-et-Ngoko" project. Therefore, project ownership arises by a statutory, property, or contractual right in the land, vegetation, or conservation or management process that generates GHG emission reductions and/or removals (where the project proponent has not been divested of such project ownership)[13]. Land use rights and carbon ownership are thus upon the project implementer (LFB). Usage rights or customary rights are granted to local populations to harvest all plant, animal, and fish resources in the UFA (non-timber forest products, NTFP; *produits forestiers non-ligneux*, PFNL) for domestic and commercial purposes, except protected species[14,15]. These usage rights are granted to local communities by the Cameroonian forestry law (Loi n°94/01, 20 January 1994). The right of use NTFP (*droit d'usage*) inside forest concession by local communities is legislated at the moment of forest concession incorporation in the national forest domain (for UFA 10-064, Decret 2005/0260/PMU of 26 January 2005, by the Cameroonian Government). In addition to complying with the forestry code, local populations will exercise their rights as set out

[12] Evidences of these forest exploitation rights are public and are available to the VVB and the VCS Standard for consultation

[13] See reference on the VCS Standard v4.7, Section 3.7.1

[14] Arrêté n° 0222/A/MINEF/ 25 mai 2002 – Art. 6, - Affectation des terres et droits d'usage

[15] Arrêté n°0648/MINFOF du 18 décembre 2006 fixant la liste des animaux des classes de protection A, B et C

	in this forest management plan. In the area of UFA 10-064, as in all state-owned forests in the Republic of Cameroon, no settlement activity is allowed, except for the semi-nomadic populations (*Baka* ethnic group), who historically lived in the forests. These populations are allowed full access to the resources that the forest provides, such as the NTFP harvest, traditional hunting, and the harvest of wood for domestic purposes.
Stakeholder diversity and changes over time	The project area is located in the Moloundou district (*arrondissement* or *commune*), Boumba-et-Ngoko *départment*, in the East Region of Cameroon. In 2018, the population of the district was estimated at 31,621 inhabitants, spread over 29 villages[16]. The population of Socambo and Mongokélé is estimated at 685 and 242 inhabitants, respectively. Mongokélé is the smallest village in the district, and it is often associated with Socambo. In terms of age distribution, the most represented category is the one from 15 to 34 years (34%). The *Bantu* (Bangando, Bakwélé, Sangha-sangha) make up the vast majority of the commune's population, compared with the *Baka*, who are in the minority. The percentage of the *Baka* population is around 17%[17]. The gender distribution shows substantial equity[18,19]. Since the last verification, no significant change in stakeholder diversity and change over time was identified.
Expected changes in well-being	Stakeholders as local communities will benefit from major ecosystem integrity and less disturbance from the forest logging concerning the baseline scenario. As presented before, the local communities located around the project area will still benefit from customary usage rights inside the project area (traditional and subsistence hunting, harvest of vegetal material for food and medicinal use and fuelwood),

[16] Plan Communal de Développement (PCD) de Moloundou, May 2018. Accessible at: https://www.pndp.org/documents/PCD_MOLOUNDOU_2018.pdf

[17] PCD Moloundou, May 2018

[18] PCD Moloundou, May 2018

[19] Hebga Nyongo et al., 2019. «Décentralisation et régulation sociale inclusive enquête sociodémographique pilote sur la participation des peuples autochtones de la forêt (Baka-Bakola-Bagyeli et Bedzang) à la prise de decision locale», available at: https://auf.hal.science/hal-02320601/

	so they will not experience any disruption concerning the previous rights. On the contrary, in a review article List et al. (2005)[20] demonstrated that in the considered cases (which include also Cameroon) logging activities show a negative impact on the availability of NTFPs. Thus, the preservation of the forest concession from logging activities will also increase the potential of NTFPs availability for the local communities.
Location of stakeholders	The project area is located in the most remote and with the lowest population density in the Moloundou *arrondissement*, as can be seen in Figure 3 (from the Joint Project Document and Verification) and Figure 4 (from the Moloundou District Development Plan, 2018). The forest is only home to some semi-nomadic communities (*Baka* ethnic group), which due to the erratic nature of their settlements, and because they are located in the heart of the forest on non-timber forest products and hunting routes (both of a seasonal nature) cannot be intercepted.
Location of resources	The local communities have customary access inside the whole project area, located inside the UFA 10-064 in the Boumba-et-Ngoko department. Several project stakeholders, such as the forest ranger and the gendarmerie station chief, have competence that overlaps with the project area and are thus collaborating with LFB in protecting and securing the area from illegal activities.

[20] L. Rist et al., “The impacts of selective logging on non-timber forest products of livelihood importance,” Forest Ecology and Management, vol. 268, pp. 57–69, Mar. 2012, https://doi.org/10.1016/j.foreco.2011.04.037

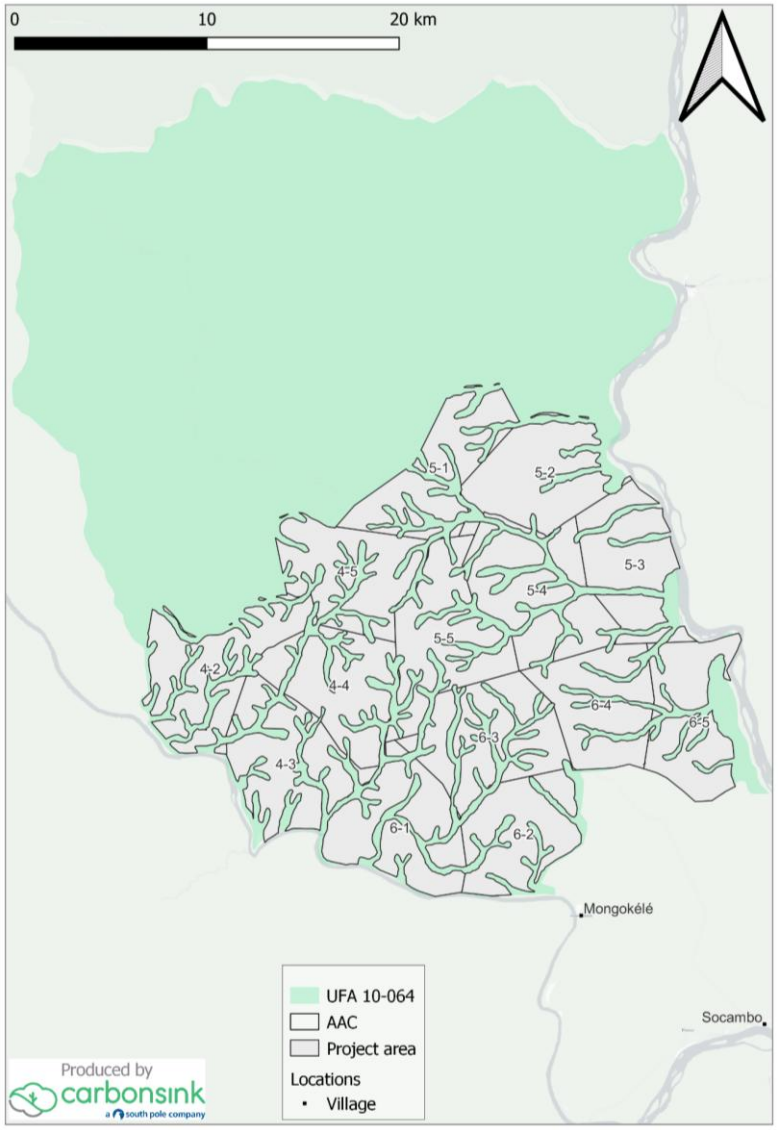

Figure 3: Project Area with AACs and nearby villages

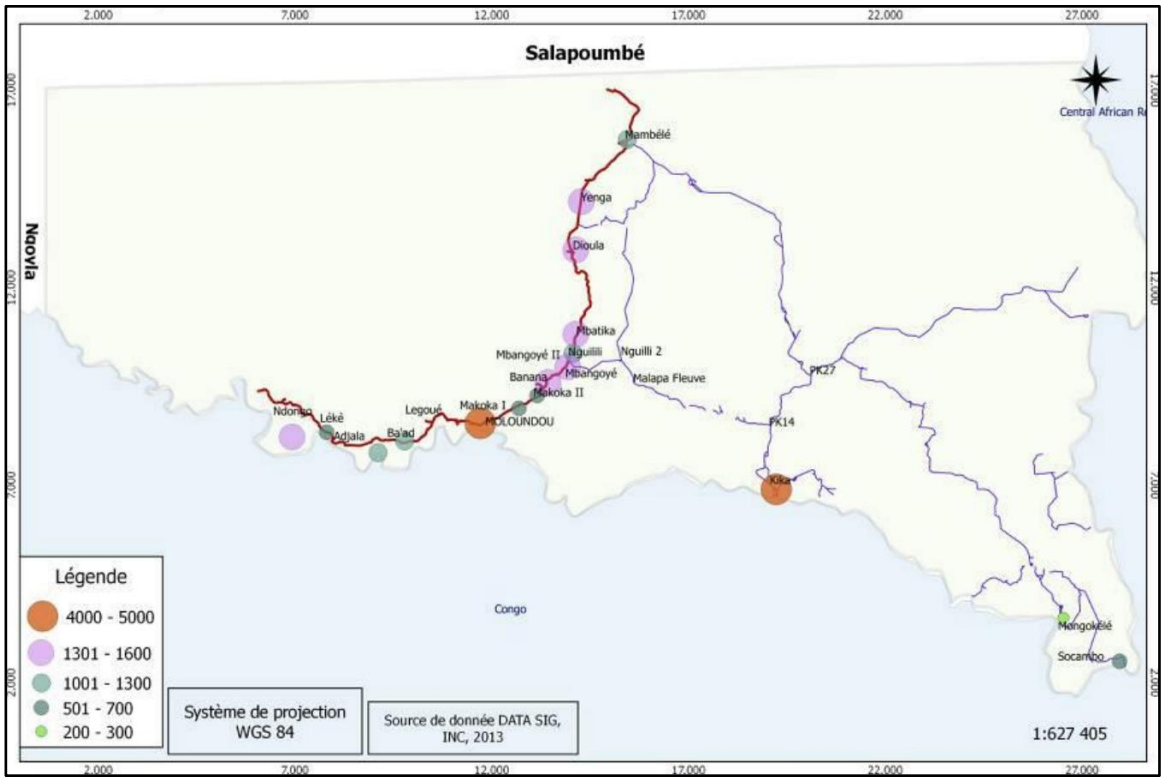

Figure 4: Moloundou district population distribution map, taken from "Plan Communal De Developpement De Moloundou" (2018)

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	Ongoing consultation with stakeholders and the communities involved in the project was undertaken on 6 December 2023 in the village of Socambo (Moloundou sub-district), with the presence also of the inhabitants of the Mongokélé village[21]. The prefect of Moloundou was informed about the meeting and gave consent[22]. Convocation to the meeting was done in the Moloundou and Mongokélé villages by publication in the village communication board (two weeks in advance from the date of the meeting). All the relevant stakeholders were invited to the meeting, and all the participants had the opportunity to express their feelings and ideas about the current project. Representatives

[21] Evidence of the meeting and meeting notes, with signatures by the participants, can be found in the 'Supporting Information/Local Stakeholder Consultation' folder

[22] Evidence can be found in Supporting Information/Local Stakeholder Consultation/Recepisse Reunion Publique 6 Decembre 2023.jpg

	from IPs communities (particularly, regarding the *Baka* ethnic group) were present in the consultation process and they actively participated in the discussion and the feedback collection about the project. The communication with the local stakeholders regarding any project aspect including project design and implementation, results of monitoring, risks, costs, and benefits the project may bring to local stakeholders, all relevant laws and regulations covering workers' and the process of VCS validation/verification process and site visit, were therefore be ensured through a meeting with the stakeholders, were they could express their position and idea. In addition, the project proponent interviewed some of the stakeholders present at the meeting with a questionnaire, before the verification event (as mentioned in the validated version of the joint PDD&MR)[23]. The previous LSC was held in Socambo on 12/04/2022, as part of the consultation period for the project validation and first monitoring period (2018-2022): the outcomes of this consultation were presented in the Joint Validation and Verification document of the project (publicly accessible in VERRA Registry, Section 2.2).
Date(s) of stakeholder consultation	06 December 2023
Communication of monitored results	The results of the project during the monitoring period, in terms of achieved implementation of the LtPF project, were communicated to the project stakeholders during the consultation meeting held on 6 December 2023[24]. The stakeholders were informed about the areas involved in the project that would have been logged in the project area during the current monitoring period (AAC 5-1 and AAC 5-2). The project management team also renewed with a general statement the will to continue the project in the following years. The certification process under the VCM market was also

[23] Evidence provided in Supporting Information/ Local Stakeholder Consultation/LSC Socambo questionnaires 06-12-23 zipped folder

[24] Evidence provided in Supporting Information/Local Stakeholder Consultation

	presented to the present stakeholders, with a mention of the upcoming visit to the project area by the Auditor team. The stakeholders expressed their interest and will to support the Auditor site visit. Evidence of the abovementioned outcomes is available to the Auditor/Standard for verification purposes.
Consultation records	Participant signatures were gathered for all the participants before the start of the meeting. Meeting notes were retrieved by the Socambo forest ranger (*chef de poste forestier,* M. Ekomo Emvo Dieudonné) and then digitized for the formalization of the document by the Ministry of Forest (MINFOF). After the meeting, individual questionnaires were provided to random participants to gather information, suggestions and possible grievances regarding the project. The scanned copies of this signature list, meeting notes, and questionnaires are provided as pieces of evidence to the Auditor/Standard and can be consulted at every moment[25]. Photographical pieces of evidence are also provided to the Auditor/Standard to demonstrate the conduct of the meeting.
Stakeholder input	Stakeholder inputs were collected in a public intervention section and with specific questionnaires during the meeting held in Socambo. The inputs received during this concentration are presented in the below Section 2.1.5, with also the actions that were or that are going to be implemented by the project management team to update the project design. In general, stakeholders have shown a positive impression of the project (see the meeting notes and questionnaires for evidence of this). Stakeholders were also asked to provide their opinion on the positive and negative impacts of the project, and the suggested actions to increase the positive impacts of the project.

[25] Pieces of evidence regarding the LSC are presented in the Supporting Information/Local Stakeholder Consultation folder

2.1.3 Free, Prior, and Informed Consent

Consent	No ongoing or unresolved conflict is present in the area, since the IPs and LCs have the full right to benefit from NTFPs present in the project area (excluding the products coming from illegal activities such as poaching of protected species, illegal mining, and illegal timber logging). No FPIC was developed for this monitoring period. Moreover, as also stated in the meeting minutes of the LSC meeting, it's demonstrated that the project does not exacerbate nor influence the outcomes of unresolved conflicts.
Outcome of FPIC	The project has not encroached on land, relocated people without consent, and forced physical or economic displacement.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
N/A	No grievances were directly raised to LFB during the monitoring period. As repeated also during the local stakeholder consultation (6 December 2023)[26], M. René Gweth (LFB) repeated to the participants that any concern, grievance or request could be addressed to any member of CPF or Socambo forest ranger (*chef de poste forestier*). These actors will be required to communicate them to the company Filière Bois, which will deal with them as quickly as possible. Moreover, LFB also follows and adapts to the company's internal grievance procedure (revision 3, 10/09/2020)[27]. The purpose of this procedure is to describe the mechanism for resolving grievances between the company and local populations, as well as the steps taken by the company to compensate populations in the event of accidental or unintentional

[26] Supporting Information/Local Stakeholders Consultation/PV Reunion de concertation populations riveraines/FB - 6 Decembre 2023.pdf
[27] Supporting Information/FB-Procédure du GCS pour la gestion des conflits et le dédommagement des populations riveraines.pdf

	destruction of their property during forestry operations or any other activity.

2.1.5 Public Comments

Summary of comments received	Actions taken
Participants in the LSC are informed about the contact persons to reach for any grievance, concern, and suggestion on the current project. They're also keen that the project continues to protect the forest from legal logging and illegal activities (LSC Socambo questionnaires, 06/12/23).	No actions nor any project design updates were necessary.
One respondent to the questionnaires suggested the presence of tree diseases and fire along the Ngoko River border. However, all the other respondents did not mention any fire, illegal logging activity or disease in the project area (LSC Socambo questionnaires, 06/12/23).	Monitoring actions carried out during the monitoring period (remote sensing analysis and *in-situ* patrolling) didn't show any sign of plant diseases and spotted the presence of illegal fires along the Ngoko River in the project area (see monitoring results in Section 4.2).
A respondent mentioned that in the UFA 10-064 illegal mining activities are present in the illegal camping site of Mbongoli (LSC Socambo questionnaires, 06/12/23).	A significant verification and dismantling activity was carried out on 18-19 July 2023 in the illegal mining site of Mbongoli by the forest authority (*poste de controle forestier de Socambo*) and the Socambo gendarmerie (*poste de gendarmerie de Socambo*). The outcome of this mission was to identify the illegal mining activity on the site and to denounce the illegal miners; moreover, several tools to carry out illegal mining activities were confiscated. All mining activities present in the UFA 10-064 were officially banned by the Ministry of Mines (MINIDT). A commission has been also formed ('Note Service n°042/NS/B12, 07 December 2023) by the Youkadouma prefect (capital city of the Boumba et Ngoko

Summary of comments received	Actions taken
	department) to raise awareness of the regulations in force among people living illegally in Forest Management Unit 10-064. All the pieces of evidence regarding the communication, patrolling, and activities to contrast illegal logging activities in the Mbongoli site are provided to the Auditor/Standard[28].
Several participants pointed out that the road between Socambo and Moloundou is in bad condition and it could be fixed (LSC Socambo questionnaires, 06/12/23).	Actions will be taken into consideration during the next monitoring period. The road that passes through the UFA 10-064 concession is a department road (Départmentale 77, D77): the maintenance of this kind of road is not directly related to the forest concession, but it's assigned through another process. At the moment, road maintenance is not under the responsibility of LFB. Indeed, the road maintenance of this road has been granted to the company "Confex-Cam". The company responsible for the maintenance of the main road has thus started to clean road D77 from PK27, in the direction of Socambo (Congo border). The maintenance works were arrested for some time, but they started again in April 2024[29,30]. These activities are essential to allow transportation inside and outside of the project area. These updates will be communicated to the communities that are part of the project stakeholders (Socambo and Mongo Kellé).

[28] Supporting Information/Rapport Activité Risque Minière Illégale 2023

[29] https://www.mintp.cm/en/news/1926/43/Region-de-l-Est-l-entreprise-s-est-fortement-mobilisee-pour-l-entretien-aux-produits-stabilisants-de-la-route-en-terre-Nguili-Inter-N10--Keke-Mengokele--Mawa-Frontiere-Congo-150-km

[30] https://canalinfos24.com/article/entretien-periodique-aux-produits-stabilisants-de-la-route-en-terre-nguilili-inter-n10-keke-mengokele-mawa-frontiere-congo-lentreprise-sest-remobilisee

Summary of comments received	Actions taken
Two respondents suggested more support to raise public awareness of forest conservation activities (LSC Socambo questionnaires, 06/12/23).	Efforts in this regard have been taken by LFB by implementing an annual meeting with local communities living close to the project area, with updates regarding the activities developed during the previous year. Moreover, more training sessions and forest conservation awareness activities will be implemented by the project management team.
Some participants from the Baka ethnic group requested housing facilities for the *Baka*. There was also the request of a hospital and school for the *Baka*'s (LSC Socambo questionnaires, 06/12/23).	Actions will be taken into consideration during the next monitoring period. LFB/SEFAC has taken several social activities in the latest period. This can be verified in a MINFOF document related to the implementation of social works by the SEFAC group[31]. Some of these activities also concerned the *Baka* communities, as the school care. Moreover, it has been explained to the participants of the LSC meeting (Socambo, 6/12/2023) that the Socambo clinic (*centre de santé intégré*) is also available for the *Baka* community who lives in the surrounding areas. Moreover, the *Baka* community is followed by the district social services (Plan Communal du Developpement de Moloundou, 2018, Section 4.6[32]), who are supporting healthcare for the Baka. LFB/SEFAC is programming a medical delivery for the community to support healthcare (depending on the logistics and availability). Regarding the housing request, LFB is considering communicating to the relevant

[31] ATTESTATION DE REALISATIONS DES ŒUVRES SOCIALES N°000526/ARS/MINFOF/DRE/DDBN/SDF (28 February 2022)

[32] https://www.pndp.org/documents/PCD_MOLOUNDOU_2018.pdf

Summary of comments received	Actions taken
	governmental authority this request by the *Baka* community.
Fauna has increased in the UFA 10-064 area since the start of the project (LSC Socambo questionnaires, 06/12/23)	No actions nor any project design updates were necessary.
No other comments were received during the monitoring period outside the local stakeholder consultation meeting held in Socambo on 06/12/2023	N/A

2.2 Risks to Stakeholders and the Environment

	Risk identified	Mitigation or preventative measure taken
Risks to stakeholder participation	Despite being inside of the project area (UFA 10-064) no settlement is allowed apart from the *Baka* ethnic group. In the surrounding areas, according to a socio-economic survey made in 2005, there are sparse populations. It showed five residential settlements, but only the one in Socambo-Mongokélé is in the proximity of the project area (below 20 km). The main risk identified is that not all the stakeholders would be informed on time about the consultation, so they cannot assist.	The mitigation measure proposed is to carry out periodic engagements with communities through local stakeholder consultations; the participation of all the stakeholders involved in the project will be assured, as well as the freedom to express comments, suggestions, and grievances about the project. Communication with stakeholders always ensures that all the indigenous communities are represented. The inhabitants are informed about the project and the protection measures in place as part of the project activities. A stakeholder consultation was held as a preventive measure on 06/12/2023. The purpose of this meeting was to again explain the project to the local

		population (the first meeting was held on the 12th of April 2022) and gather grievances, comments, and opinions from the participants. The forest is only home to some semi-nomadic *Baka* communities, which due to the erratic nature of their settlements, and because they are located in the heart of the forest on non-timber forest products and hunting routes (both of a seasonal nature) cannot be intercepted. However, representative members of this community were present during the LSC held in Socambo and interviews were conducted from them[33].
Working conditions	In terms of workers' rights, in Cameroon they are protected through the 'Labour Code', namely Law n°92/007 of 14th August 1992 setting out how labor unions are set up and which the modalities of different labor contracts, wages, working conditions, workplace safety, wages, bodies, professional institutions, disputes, and sanctions.	LFB ensures that all the conditions stated in the 'Labour Code' are followed. Moreover, LFB also follows the Internal Safety and Health Guidelines sat down by SEFAC company[34].
Safety of women and girls	No risk identified	Marginalized groups were always included in the project consultations. As evident from the meeting notes and the interview of the stakeholders'

[33] 'PV Reunion de concertation populations riveraines/FB - 6 Decembre 2023' and Questionnaires in folder 'Supporting Information/Local Stakeholders Consultation'
[34] Supporting Information/FB-Procédure sur la sécurité et santé dans les travaux forestiers et ses secteurs d'activité.pdf

		consultations (2022 and 2023)[35], female representatives and people from *Baka* communities were present in those meetings and did not share any complaints about the risks to their communities. Moreover, LFB carried out social works, which proves the project implementer's engagement with the stakeholders that live close to the project area, with a particular focus on marginal groups[36].
Safety of minority and marginalized groups, including children	No risk identified	The mitigation measures mentioned in “Safety of women and girls” also apply to these groups.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	No risk identified	The project activities will not involve the risk of discharge of any pollutants in the project area. The project area will be not involved in logging activities that could incur the risk of pollutants spilling into the environment.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	During the second monitoring period, no discrimination and sexual harassment occurred.
Management experience	No new entities are involved in project design or implementation. Carbonsink S.r.l. is a company with more than 10 years of experience in the carbon market and has

[35] Available as supporting information for the VVB and Standard

[36] The evidence of these social works can be found at the following link (official document of the forestry minister): https://opentimberportal.org/uploads/operator_document_file/attachment/3573/sefac-proces-verbal-attestation-de-realisation-des-oeuvres-sociales-prevues-aux-cahiers-des-charges-2022-12-19.pdf

	experience in the quantification of avoided emissions from the conservation of natural forests. Filière Bois (LFB) has also carried out sustainable logging activities in concertation with local communities in Boumba et Ngoko department for 20 years.
Gender equity in labor and work	No specific activities related to gender equity are implemented in the project at date. However, the ethical code of LFB/SEFAC also promotes gender equity.
Human trafficking, forced labor, and child labor	Project does not use people for the development of activities in the project without any contract (in section 1.12 this is explained)

2.3.2 Human Rights

The use rights in the project area is temporarily granted to LFB because all the forests belong to the State; UFA 101-064 is part of Cameroon concessions where forest development has been entrusted to private companies. Local communities assert that they can access resources within the project area, while the envisaged land use, centered around forest conservation, aligns harmoniously with their existing activities such as traditional hunting, fruit picking and fishing in areas closer to their communities than the designated project zone. Consequently, if conservation measures are effectively implemented in the project area, downstream benefits may indirectly accrue to these communities, as the absence of pressures upstream could potentially yield more abundant resources. Moreover, it is crucial to emphasize that the residents' right to mobility remains unimpaired, and they retain the freedom to access the project area should they choose to do so. Internal procedures of LFB[37] are in place to ensure that all the activities related to the project are in line with applicable international human rights law, the United Nations Declaration on the Rights of Indigenous Peoples, and ILO Convention 169 on Indigenous and Tribal Peoples.

2.3.3 Indigenous Peoples and Cultural Heritage

Project activities do not imply any influence on indigenous people and cultural heritage.

2.3.4 Property Rights

Disputes over rights to territories and resources	N/A
Respect for property rights	According to the Cameroonian Forestry Law (1994, Article 8), the right of use or custom is recognized for local populations to exploit all wildlife and fishery forest

[37] See for example, the document 'Supporting Information/Declaration-SEFAC-EN-legality.pdf'

	products for personal use, except protected species. Cameroon's forest legislation recognizes the right of indigenous peoples living or within a forest the customary right or right of use. This is the right to use forest products to meet their daily subsistence needs. of the forest. This right is exercised freely and is recognized as long as the beneficiaries maintain their geographical proximity to the forest. It applies to all forest products except those explicitly prohibited by law. However, the law stipulates that this right be limited if it becomes incompatible with the sustainable management of forest resources. These rights are also mentioned in the decision no. 0108/D/MINEF/CAB of 9 February 1998, on the application of intervention standards in forestry in the Republic of Cameroon. In the latter, it is mentioned that “local populations have the right to use forest products, including the forest's wildlife and fishery resources, for personal use. This right consists in the performance of traditional activities such as the collection of secondary forest products, notably raffia, palm, bamboo, rattan or food products and firewood”.

2.3.5 Benefit Sharing

Summary of the benefit sharing plan	There is not a specific benefit-sharing agreement in the project, since the concession is granted to the forest implementer (LFB), which has thus the legal right to operate activities and claim benefits from these operations in the project area. By the way, even in the absence of logging activities, LFB continues to contribute to local development through the payment of an annual forest tax (Redevance Forestière Annuelle, RFA). The amount of this tax is set in the forest management plan. 50% of the total amount is provided annually to the Cameroonian State, while the remaining 50% is split between the Moloundou district (40%) and the communities living next to the concession area (10%).
Benefit sharing during the monitoring period	No specific benefit-sharing measures were implemented during the monitoring period under the project. However,

	LFB contributed during this monitoring to local development through the payment of the RFA (as mentioned before).

2.4 Ecosystem Health

	Risk identified	Mitigation or preventative measures taken during the monitoring period
Impacts on biodiversity and ecosystems	There are no major risks identified for biodiversity and ecosystems, as the project is going to foster it. On the contrary, the absence of logging will reduce forest fragmentation (residual stand damage, skid trails, infrastructure for logging activities, etc.) and will increase the resilience of ecosystems and biodiversity in the area[38]. However, only the risk of poaching and illegal logging threatens the biodiversity of these ecosystems.	Stakeholder engagements are carried out also to gather information on the exploitation of hunting inside the forest concession. Moreover, patrolling activities are carried out, also in collaboration with local authorities. This would ensure that the risk of illegal hunting and logging inside of the reserve is minimized.
Soil degradation and soil erosion	No risk identified	Since the area is almost flat and covered by dense vegetation, no risk of soil degradation and erosion is present in the area.
Water consumption and stress	No risk identified	As already mentioned in the NPRT, water stress and droughts are not common problems in the project area. These risks are also minimized

[38] Rogers et al., 2022. Using ecosystem integrity to maximize climate mitigation and minimize risk in international forest policy. Front. For. Glob. Change 5:929281. doi: 10.3389/ffgc.2022.929281

Usage of fertilizers	No risk identified	No fertilizers are used in the project area since no agricultural activities are being implemented here (agriculture is prohibited in the UFA 10-064 forest concession).

2.4.1 Rare, Threatened, and Endangered species

Endangered Fauna: class A and B, under the 'Arrêté n°0648/MINFOF' (18/12/2006)	The project aims to stop planned logging activities, in order to protect the forest and avoid emissions generated by logging, transport, processing of raw material as well as collateral damage to vegetation, decomposition of material left in the forest, construction of forest tracks for transport to the storage point, construction of hydraulic engineering works, construction of bridges and other infrastructure. A further advantage is due to the cessation of the disturbance to the fauna. The Commune of Moloundou is home to an abundance and diversity of wildlife. The wildlife includes animals such as: rats, bats, deer, boa snakes, hares, vipers, hedgehogs, antelopes, porcupines viper, hedgehog, antelope, porcupine, monitor, mole, wild boar, sloth, tortoise, black snake, monkeys, chimpanzee and gorilla, poultry. Many of these animals are already endangered. Traditional and subsistence hunting is allowed for local communities inside the project area and the permanent concessions under the Cameroonian forestal domain. However, several animal species are protected (Arrêté n°0648/MINFOF du 18 Décembre 2006 'fixant la liste des animaux des classes de protection A, B et C) and cannot be hunted. These include fully protected species (class A), partially protected species (class B), and class C species that are fully available for hunting and household consumption. Illegal hunting could be thus present in the project area, to gather some of these species (class A, i.e. elephant, gorilla, gray parrot, pangolin, chimpanzee, ...) for the illegal trade market

	(particularly the East Asia one[39]). These species have been listed as Critically Endangered according to the IUCN Red List of Species[40]. However, this project is putting in place some mitigation activities and monitoring to identify and decrease this risk (see Section 3.3 and the Adaptive Management Plan[41] for more information).
Swamp forest (UFA 10-064 *MIT* and *MIP* stratum)	The project does not have any activities that adversely affect the swamp forests adjacent to the project area in the eastern part (located in the stratum *MIT* and *MIP* under the UFA 10-064 forest stratification). In fact, under the FCBN conservation project, these swamp forests are protected against any degradation. It is clear from the analysis of satellite imagery that no degradation is detected around the project area.

2.4.2 Introduction of species

The current section does not apply to the current project, since no species will be introduced in the project area through project activities.

2.4.3 Ecosystem conversion

This section does not apply to the present project, since it falls under the Improved Forest Management (IFM) with the activity type 'Conversion from Logged Forest to Protected Forest (LtPF)'.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project aims to achieve net GHG by preserving the project area from the exploitation of forest resources, which would anyway be used in the following years as foreseen in the baseline scenario. The project surface corresponds approximately to 33% of the total UFA 10-064 surface, including a part of UFE 4 (from AAC 4-2 to AAC 4-5) and the entire UFE 5 and UFE 6 (Figure 5).

[39] Muckete, 2021. Current Trade and Trafficking Dynamics of the African Grey Parrot (Psittacus erithacus) in Cameroon. Accessible at: http://dx.doi.org/10.13140/RG.2.2.31534.38720
[40] Accessible at: https://www.iucnredlist.org/
[41] Available to Auditor/Standard in Supporting Information/NPRT/Internal Risks/VCS2897 CAM IFM Adaptive Management Plan 2022-2023 v1

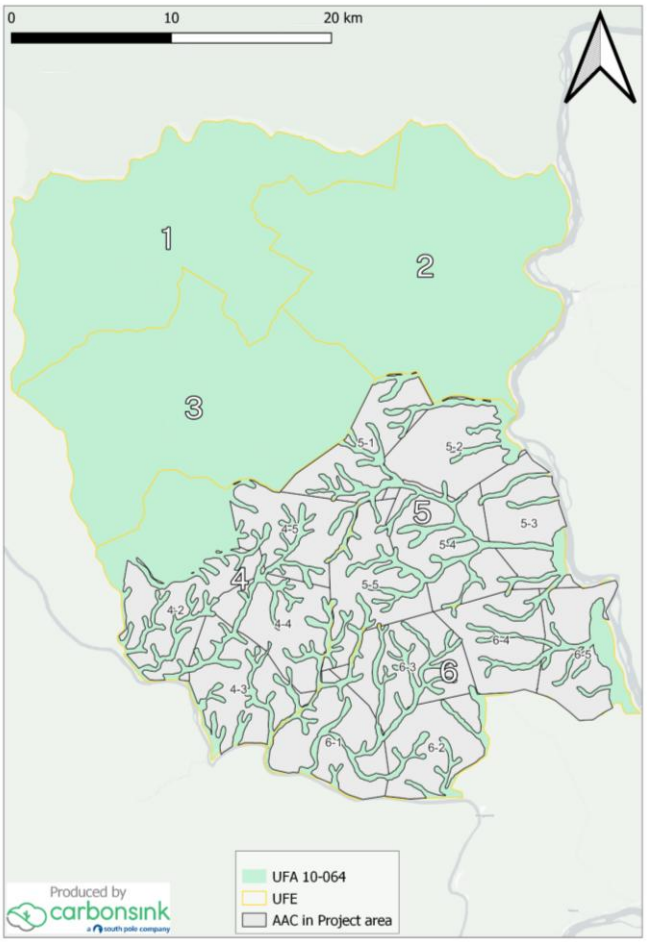

Figure 5: Map with the location of the project area inside the UFA 10-064 (including the ACCs)

In the current monitoring period (2022-2023), the Assiette Annuel de Coupe (AAC) 5-1 and 5-2 would have been logged in the baseline scenario, as for the UFA 10-064 Forest Management Plan (2005). These two ACCs joined to the ones in the previous verification (4-2, 4-3, 4-4, and 4-5), which have been monitored (Table 1), together with the rest of the project area.

Table 1: UFE's and ACC's that are producing VCUs during the current monitoring period, following the UFA 10-064 forest management plan

UFE	ACC	Surface (ha)	Verification period
4	4-2	2,797	1st and 2nd

	4-3	2,793	1st and 2nd
	4-4	2,637	1st and 2nd
	4-5	2,635	1st and 2nd
5	5-1	2,447	2nd
	5-2	2,949	2nd

The activities implemented during the monitoring period are presented in Section 4.3. (Monitoring plan). In summary, the activities during the project monitoring period consist of:

- Remote sensing analysis: it is used to be combined with on-the-ground data to determine illegal logging and/or forest fires happening inside the project area;
- *In-situ* patrolling: Monitoring activities (carried out by the SEFAC group monitoring team) are implemented to register any signal of illegal activities (e.g. illegal logging, poaching, illegal mining, and natural disturbances). The observations recorded are used to calculate GHG emissions and losses in the project scenario. Also, they track the status of the forest by detecting and alerting in case of forest fires, and checking the presence of pests and/or diseases;
- Local stakeholder consultations: Consultation of project stakeholders was carried out by the CSG and LFB teams. The goal is to provide the local population and stakeholders the information on the project and its activities and to gather information and opinions from the participants on the possible social and environmental implications of the project. The stakeholders agreed to the continuation of the involvement in the project.

Also, the non-permanence risk factor for AFOLU projects was updated using the VCS Tool for AFOLU Non-Permanence Risk tool v4.2, as described in Section 4.4. Natural risks were re-assessed based on historical and future trends related to climate change's expected impacts. Finally, an adaptive management plan[42] was developed and adopted: this plan aims to identify, assess, and create a mitigation plan for potential risks to the project.

[42] Supporting Information/NPRT/Internal Risks/VCS2897 CAM IFM Adaptive Management Plan 2022-2023 v1

3.2 Deviations

3.2.1 Methodology Deviations

As stated in the Joint PD and MR of the project[43], there were 2 requested deviations according to paragraph 3.20 of VCS-Standard v4.7: "Projects are permitted to deviate from the procedures set out in methodologies in certain cases, such as where alternative methods may be more efficient for project-specific circumstances, or where the deviation will achieve the same level of accuracy or is more conservative than what is set out in the methodology"[44].

Validation of the forest inventory (baseline scenario emissions)

To calculate the carbon stocks in commercial timber volumes in the baseline scenario, it is acceptable to use pre-existing forest inventory data for this purpose. However, when the forest inventory data is more than 10 years old, the volume estimate derived from the pre-existing data needs to be validated with limited sampling within the project area through the use of the CDM tool "Tool for Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities" (Section 8.1.1 of the VCS VM0010 methodology, v.1.3). The same methodology also states that if the data collected from the sampling does not differ by the accepted 90% confidence interval (±10% from the average value to be validated), it is possible to accept the inventory for the project estimates.

Forest inventory for the UFA 10-064 was carried out in 2005[45]. This inventory is thus more than 10 years old at the project start date (2018) and must be validated through limited sampling (Section 8.1.1 of the methodology). The project proponent proposed a methodological deviation for the validation of this forest inventory. Following the Cameroonian Law (Arrêté n° 0222/A/MINEF du 25/05/2002, Art.41), the forest inventory for the annual logging activities (AAC) must be carried every one or two years on 100% of the AAC surface ("inventaire en plein"). This inventory must be carried out using the same methodologies as those used for the inventory of the UFA. These censuses are used to organize the logging plan in each AAC and are certified by MINFOF (Cameroonian's Forestry Ministry). These documents are issued by the Ministry as Annual Operation Permission (Permis Annuel d'Operation – PAO), presenting the allowable exploitable volumes for each tree species, above the Administrative Minimum Management Diameters (DME). The output of each PAO is the extractable volume of wood in each AAC. These volumes are used by

[43] Publicly accessible at: https://registry.verra.org/app/projectDetail/VCS/2897

[44] These deviations were accepted during the validation and verification of the project by the Auditor (AENOR) and the VERRA Standard.

[45] Rapport d'Inventaire d'aménagement (R.I.A.), 2006

the logging company to draw up an internal guideline called the Annual Operations Plan (Plan Annuel d'Operation).

The proposed methodological deviation is to use the above-mentioned censuses (Annual Operation Permissions, PAO) instead of the limited samplings (from the CDM Tool's sample plots) to validate the UFA 10-064 forest inventory. The advantage of using these documents, instead of making sample plots, lies in the fact that PAO censuses record all the potentially exploitable trees for each species above a certain DME in the entire surface of the AAC, instead of limited sample plots. Data on extractable volumes of wood from 2011 until 2017 (corresponding to the AACs 2-5, 3-1, 3-3, 3-4, 3-5 and 4-1) was thus compared to those of UFA 10-064 forest inventory data[46]. These data included all the forest productive strata, including the MIT stratum (which finally is not part of the project area). PAO documents accounted for a forest census that covers a cumulative 19% of the total UFA 10-064 surface. Furthermore, before AAC 4-2 was converted into a non-logged area (2018), an additional census was made by LFB, to ask for proceeding with the annual allowable cut in this area. PP proposed to include this census, combined with the 2011-2017 ones, to reach a coverage of 22% of the total area of the UFA 10-064 (about 25,500 ha). These censuses are allowed to have a forest census rate that is complete, punctual, unequivocal, and validated by the local authorities. These direct measurements are thus representative of an area that is about 66% of the size of the project area. The deviation between the 2005 concession inventory and the forest inventories carried out in the UFA annually between 2011-2018 is about +8%. These inventories could thus be considered accurate enough to validate the forest inventory values from 2005. Hence, limited sampling could not develop the same accuracy in the forest inventory validation as the data from the considered PAOs. For this reason, the proposed deviation will not negatively impact the conservativeness of the quantification of forest inventory, and thus the related GHG emission reductions or removals from the project. Forest inventory validation estimations are presented as evidence to the Auditor/Standard[47].

Illegal logging monitoring (project scenario GHG emissions)

The VCS VM0010 methodology v.1.3 in Section 8.2.2.2 states that Participatory Rural Appraisals (PRAs) are needed to state the presence of illegal logging activities in the project area. In the case that during these participatory surveys at least 10% of the participants confirm the presence of illegal logging activities, the methodology indicates the need to carry out sampling areas to quantify the damaging event (option B). However, footnote n°31 (p. 44 of the VCS VM0010 methodology v.1.3) states that project proponents "should use techniques that are suitable to their specific situation and that have been published in peer-

[46] The pieces of evidence will be provided to the Auditor/Standard regarding this process

[47] Supporting Information/Previous Validation and Verification Documents/Validation_forest_inventory-VCS2897-2011-2018.xlsx

reviewed papers". So the methodology suggests that it is possible to use remote sensing techniques to assess and quantify forest cover loss (illegal logging) in the project area. These remote sensing analyses are more conservative concerning ground-based measurements since they can spot illegal logging areas even when PRA surveys do not result in the potential presence of illegally logged areas. Moreover, the monitoring scheme presented here includes a higher frequency and spatial distribution compared to the one required by Option A (PRA) of the methodology, since the study will be carried out each year and over the entire project area. It's not possible to cover the entire project area with patrolling since the dense moist deciduous forest is difficult to penetrate. In addition, the proposed analyses are more accurate than participatory surveys since they can cover the forest canopy change with a more granular time rate across the whole project area. In validation and verification, analysis with data from Hansen et al. (2013)[48] to evaluate the potential illegal logging in the area was used and validated by the Auditor/Standard. However, since these data are not available suddenly at the end of the year, we propose to use another remote sensing analysis to identify potentially illegally logged areas in a more timely way. We thus propose to use cartographic information from the supervised classification of satellite images of Sentinel-2A (2022-2023) to identify Forest and Non-Forest areas. For the classification from each year, the methodology based on supervised remote-sensing techniques was used to generate classes such as Forest, Non-Forest, and Water. The training areas of each group are randomized and are assigned to the satellite image via interpretation performed by an expert in geospatial solutions and with a minimum registration of 40 points per class. Moreover, this methodology is specifically crafted for the project area and not a global one, with a spatial higher accuracy (10-m of Sentinel 2-A, over the 30-m values by Hansen et al.). The output of this analysis is then associated with the area potentially impacted by illegal logging (A_{dist_LI}). The total influence of potential illegal logging is then tested for significance over the entire project area with the application of the CDM Tool for significance[49]. The methodology (Section 8.2) states that illegal logging below de minimis should be considered negligible, following the rule set up in the VCS AFOLU Requirements (VCS Methodology Requirements v4.2). This document states that a specific project or leakage GHG emissions source "may be deemed de minimis and do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than five percent of the total GHG benefit generated by the project". If the illegal logging in the project area spotted during the monitoring period appears to be significant, Option B (limited and permanent sample plots) of Section 8.2.2.2 of the VCS VCM0010 methodology will be put in place in the concerned area by the project proponent.

[48] Hansen et al., "High-Resolution Global Maps of 21st-Century Forest Cover Change," Science, vol. 342, no. 6160, pp. 850–853, Nov. 2013, doi: https://doi.org/10.1126/science.1244693

[49] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-04-v1.pdf

The full methodology specific and results of the analysis are presented below in Section 5.2 and provided for assessment to the Auditor/Standard[50].

The project proponent thus proposes here to investigate the potential presence of illegal logging in the project area through the analysis of spatiotemporal datasets from remote sensing data. This method assures a complete and trustful analysis of the phenomenon of illegal forest loss. Moreover, further measures have already been put in place by the project proponent in the project area to tackle illegal logging:

- monitoring reports have been and will be produced every year, after patrolling activities of the project area (see Section 5.3 for more information). These are also mandatory and report all illegal activities within the UFA that are monitored by the LFB from year to year;
- UFA 10-064 is part of the Cameroonian forest domain. As a state-owned forest, there are legislative references that require concessionaires (in this case LFB) to set up facilities to control entry and exit from the forest, along the main route at the two access points. This requirement is necessary to counteract any illegal removals from the forest, such as poaching, but also illegal logging. In the UFA 10-064, access points are monitored with two gates controlled by guards. On the field, it takes the form of a level crossing, monitored 24 hours a day by a private security company, which controls access and the opening/closing of the level crossing at each entrance/exit (evidence will be provided to the VVB).

3.2.2 Project Description Deviations

No project description deviations were implemented during the current monitoring period (2022-2023).

3.3 Grouped Projects

Not applicable, since the project is not a grouped project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes ☒ No

The baseline reassessment for the project should be done in 2028 (10 years after the start date of the project).

[50] Supporting Information/Monitoring Documents/240218_Supervised_Classification_IFM_Cameroon.docx

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

The parameters included in the following chapter have been chosen for their conservative nature, with the intention of not overestimating GHG emissions from anthropogenic activities. Since we conservatively decided to not include in the baseline scenario the GHG emissions from the establishment of forestry infrastructure and the fuel consumption, the parameters related to these processes have been omitted from the current monitoring (this was already done in the validated Joint Validation and Verification report).

Data / Parameter	$V_{j,i}$
Data unit	m^3
Description	Merchantable volume for species *j* in stratum *i*
Source of data	Estimated from the UFA 10-064 Forest Inventory, considering only the project area. The Forest Inventory was already formulated as total extractable volumes, so no allometric equations were used to calculate this variable for each species *j* in stratum *i*.
Value applied	Various (see Excel 'ExtractableVolumes_Project_UFA1064-VCS2897', sheet '1.Extr volumes (UFA 10-064)', from the validation and first verification documentation. Available in 'Supporting Information/ Previous Validation and Verification Documents' folder)
Justification of choice of data or description of measurement methods and procedures applied	The UFA 10-064 Forest Inventory was carried out by a third-party inventory team[51], following the provisions of the Cameroon forestry law, using the nationally approved software TIAMA[52,53].

[51] The forest inventory report is available to the VVB in the 'Supporting Information/Previous Validation and Verification Documents' folder, as the "R.I.A 2006.pdf" file

[52] Loi n° 94/01 du 20 janvier 1994, Cameroun (available in Supporting Information folder, "cmr4845 - LOI N°94_01 du 20 janvier 1994.pdf")

[53] Décret n° 95/531/PM – Titre IV – Chapitre I; II (available in Supporting Information folder, "cmr4471 - Décret nº 95-531-PM.pdf")

	These values are already considered a minimum exploitable diameter that is fixed by governmental laws.
Purpose of data	Determination of baseline scenario (timber harvest plan). These data were used to evaluate the amount of allowable timber volume in the project area.
Comments	N/A

Data / Parameter	$V_{EX,j,i\|BSL}$
Data unit	m^3 ha^{-1}
Description	Mean volume of extracted timber per unit area for species *j* in stratum *i*
Source of data	UFA 10-064 Forest Inventory and Project area stratification shapefile
Value applied	Various (see Excel 'ExAnte_BoumbaAndNgoko-VCS2897_VM0010_v4', sheet 'BSL'. Available in 'Supporting Information/ Previous Validation and Verification Documents' folder)
Justification of choice of data or description of measurement methods and procedures applied	The data come from the UFA 10-064 Forest Inventory and the Forest Management Plan. Data were obtained from the net production capacity and the production area referred to as the project area (divided by stratum). Since the merchantable volume of timber in the forest inventory ($V_{j,i\|BSL}$) is already considered legal limits (minimum DBH), the $V_{EX,j,i\|BSL}$ has the same value.
Purpose of data	Determination of baseline scenario
Comments	N/A

Data / Parameter	CF_j

Data unit	tC · t d.m.$^{-1}$
Description	Carbon fraction of dry matter for species *j*
Source of data	From IPCC (2006), Guidelines for National Greenhouse Gas Inventories, Volume–4 - Agriculture, Forestry and Other Land Use, Table 4.3, for tropical wood
Value applied	0.49
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of data	Determination of baseline scenario
Comments	The parameter needs to be re-assessed and updated (if appropriate) as part of the baseline re-evaluation.

Data / Parameter	$BCEF_R$
Data unit	t d.m. · m^{-3}
Description	Biomass conversion and expansion factor applicable to wood removals in the project area
Source of data	Value from IPCC (2006), Guidelines for National Greenhouse Gas Inventories, Volume–4 - Agriculture, Forestry and Other Land Use, Table 4.5, for humid tropical natural forests
Value applied	1.67
Justification of choice of data or description of measurement methods and procedures applied	The value is based on the average productivity of 118 m^3/ha as reported in Table 3.3 of the UFA 10-064 Management Plan. Since no precise and punctual data on Cameroonian forests regarding this parameter, its value was retrieved from the methodology's recommended source, inherent to the specific eco-region of the project area.
Purpose of data	Determination of baseline scenario. This parameter was used to calculate the mean carbon stock in eq. 3
Comments	N/A

Data / Parameter	D_j
Data unit	tC · t d.m.$^{-3}$
Description	Basic wood density of species *j*
Source of data	Species-specific data sources (detailed in the Excel 'ExAnte_BoumbaAndNgoko-VCS2897_VM0010_v4', sheet 'Bibliography'. Available in 'Supporting Information/ Previous Validation and Verification Documents' folder)
Value applied	Various
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of data	Determination of baseline scenario. This parameter was necessary to calculate the carbon stock in eq. 4
Comments	N/A

Data / Parameter	$F_{RSD\|BSL}$
Data unit	dimensionless
Description	Residual Stand Damage Factor
Source of data	From: Brown et al. (2005), 'Impact of selective logging on the carbon stocks of tropical forests: Republic of Congo as a case study'.
Value applied	1.74
Justification of choice of data or description of measurement methods and procedures applied	The area of the reference is contiguous to the project area. So, the RSD factor for the project area is assumed to be the same area as the one evaluated in the study.
Purpose of data	Determination of baseline scenario
Comments	N/A

Data / Parameter	*OF*
Data unit	$kg \cdot kg^{-1}$
Description	Fraction of wood products that will be emitted to the atmosphere between 3 and 100 years after production
Source of data	Value from Winjum et al. (1998)[54]
Value applied	0.86 (sawnwood), 0.99 (roundwood)
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of data	Determination of baseline scenario
Comments	Parameters need to be reviewed as part of the baseline re-evaluation

Data / Parameter	*SLF*
Data unit	$kg \cdot kg^{-1}$
Description	Fraction of wood products that will be emitted to the atmosphere within 3 years of production
Source of data	Value from Winjum et al. (1998)
Value applied	0.12 (sawnwood), 0.18 (roundwood)
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of data	Determination of baseline scenario
Comments	Parameters need to be reviewed as part of the baseline re-evaluation.

[54] Source: https://doi.org/10.1093/forestscience/44.2.272

Data / Parameter	*WW*
Data unit	$kg \cdot kg^{-1}$
Description	Fraction of extracted biomass effectively emitted to the atmosphere during production
Source of data	Value from Winjum et al. (1998)
Value applied	0.24 (sawnwood), 0.24 (roundwood)
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of data	Determination of baseline scenario
Comments	Parameters need to be reviewed as part of the baseline re-evaluation.

Data / Parameter	RGR_i
Data unit	$tC \cdot ha^{-1} \cdot yr^{-1}$
Description	Forest regrowth rate post timber harvest for stratum *i*
Source of data	IPCC Refinement of 2006 Guidelines for National Greenhouse Gas Inventories (2019), Table 4.9 and Table 4.7 African tropical moist deciduous forest
Value applied	0.49 (*DHC* stratum) and 1.07 (*S* stratum) (see Excel 'ExAnte_BoumbaAndNgoko-VCS2897_VM0010_v4', sheet 'Bibliography'. Available in 'Supporting Information/Previous Validation and Verification Documents' folder)
Justification of choice of data or description of measurement methods and procedures applied	Since selective logging was applied in the baseline scenario, only a share of the trees in the logged area is subjected to regrowth after timber harvest. For this reason, the regrowth was calculated only on the share of biomass that should be subjected to logging: hence, this share was calculated by dividing the above-ground biomass (AGB, t d.m./ha) logged by the one related to the natural forest (for each stratum). Then it was assumed that the logged forest regrows with an RGR

	proper to the one of secondary forest (<20 years), to be conservative (since this type of vegetation have a higher regrowth rate). See calculation steps in the '*ExAnte_BoumbaAndNgoko-VCS2897_VM0010_v4*' spreadsheet ('Bibliography' sheet)
Purpose of data	Calculation of baseline scenario
Comments	Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	PML_{FT}
Data unit	%
Description	Mean merchantable biomass as a proportion of total aboveground tree biomass for each forest type
Source of data	The calculation are presented in the Excel ' ExAnte_BoumbaAndNgoko_VM0010-VCS2897_v4', sheet 'MarketLeakage_Cameroon'
Value applied	8.91%
Justification of choice of data or description of measurement methods and procedures applied	This value has been chosen since no market-effect leakage was found following the implementation of the project, as explained in Section 4.3 of this document
Purpose of data	Leakage calculation
Comments	Parameters need to be reviewed as part of the baseline re-evaluation.

Data / Parameter	$A_{1,i,p}$
Data unit	Ha
Description	The area of stratum *i* in land parcel *p* that was harvested 1 year ago
Source of data	Project area shapefile (divided per stratum) and Excel ' ExAnte_BoumbaAndNgoko_VM0010-VCS2897_v4', sheet ' Areas_TimberHarvestSchedule'

Value applied	Various
Justification of choice of data or description of measurement methods and procedures applied	The surface areas have been taken from the Timber Harvest Plan of the UFA 10-064
Purpose of data	Calculation of baseline scenario
Comments	N/A

Data / Parameter	$A_{2\text{-}10,i,p}$
Data unit	Ha
Description	The area of stratum *i* in land parcel *p* that was harvested between 2 and 10 years ago
Source of data	Project area shapefile (divided per stratum) and Excel 'ExAnte_BoumbaAndNgoko_VM0010-VCS2897_v4', sheet 'Areas_TimberHarvestSchedule'
Value applied	Various
Justification of choice of data or description of measurement methods and procedures applied	The surface areas have been taken from the Timber Harvest Plan of the UFA 10-064
Purpose of data	Calculation of baseline scenario
Comments	N/A

Data / Parameter	$A_{11\text{-}20,i,p}$
Data unit	Ha
Description	The area of stratum *i* in land parcel *p* that was harvested between 11 and 20 years ago
Source of data	Project area shapefile (divided per stratum) and Excel ' ExAnte_BoumbaAndNgoko_VM0010-VCS2897_v4', sheet 'Areas_TimberHarvestSchedule'

Value applied	Various
Justification of choice of data or description of measurement methods and procedures applied	The surface areas have been taken from the Timber Harvest Plan of the UFA 10-064
Purpose of data	Calculation of baseline scenario
Comments	N/A

Data / Parameter	A_{t+}
Data unit	Ha
Description	Cumulative area harvested until time t*
Source of data	Project area shapefile (divided per stratum) and Excel 'ExAnte_BoumbaAndNgoko_VM0010-VCS2897_v4', sheet 'Areas_TimberHarvestSchedule'
Value applied	Various
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of data	Calculation of baseline scenario
Comments	N/A

4.2 Data and Parameters Monitored

In addition to the parameters listed in the tables above, the following tables present parameters for which monitoring is necessary.

Data / Parameter	$A_{DIST_IL,i}$
Data unit	ha
Description	Area potentially impacted by illegal logging in stratum *i*
Source of data	Analysis of remote sensing derived dataset from Sentinel 2-A data. The rationale and results of this analysis are presented

	in Section 3.2.1 and Section 5.2. Calculations are presented in the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5, 'PRJ_Illegal_Logging' sheet
Description of measurement methods and procedures to be applied	Please refer to Section 3.2.1, 'Illegal logging monitoring (project scenario GHG emissions) and related documents
Frequency of monitoring/recording	Annually cumulative values for each monitoring period
Value monitored	*Ex-post*, about 33 ha in the project area from remote sensing analysis (considering also the temporary and permanently flooded areas that were excluded as project areas). Moreover, during the monitoring period, the project proponent gathered *in-situ* information about illegal logging through monitoring reports (*in-situ* monitoring), and a conservative estimate of 4.2 ha was considered impacted by illegal logging activities (0.7 directly related to logging activities and 3.5 for subsistence agriculture). A total of about 37 ha was assumed as impacted by illegal logging during the monitoring period.
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of project emissions (Forest disturbances – Illegal logging)
Calculation method	Remote sensing analysis and *in-situ* monitoring. Please refer to Section 3.2.1 and Section 5.2
Comments	*Ex-ante* estimation must be made of illegal logging in the with-project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging.

Data / Parameter	$C_{DIST_IL,l,t\|PRJ}$
Data unit	tCO2e

Description	Biomass carbon of trees cut and removed through illegal logging in stratum i at time t
Source of data	Analysis of remote sensing derived dataset from Sentinel 2-A data. The value of aboveground biomass to estimate potential emissions come conservatively from the MINFOF and FAO forest inventory database of Cameroon (2005)[55]. The rationale and results of this analysis are presented in Section 3.2.1 and Section 5.2. Calculations are presented in the *ex-post* calculations spreadsheet, 'PRJ_Illegal_Logging' sheet.
Description of measurement methods and procedures to be applied	Please refer to Section 5.2, 'Illegal Logging'
Frequency of monitoring/recording	Repeated each time limited sampling of ADIST_IL, indicates illegal logging
Value monitored	*Ex-post*, an estimate of 19,275 tCO2e over the monitoring period
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of project emissions (Forest disturbances – Illegal logging)
Calculation method	Remote sensing analysis and *in-situ* monitoring. Please refer to Section 5.2 and *ex-post* calculations
Comments	N/A

Data / Parameter	$A_{burn,i,t}$
Data unit	Ha
Description	Area burnt in stratum *i* at time *t*

[55] MINFOF., FAO., 2005. Evaluation Des Ressources Forestières Nationales Du Cameroun. Unité Technique du Projet d'Inventaire forestier national en collaboration avec la FAO, Yaounde, Cameroun.

Source of data	Analysis from MODIS MCD64A1 Version 6.1 Burned Area product data[56] for the monitored period (2022-2023), and *in-situ* monitoring reports
Description of measurement methods and procedures to be applied	Analysis of remote sensing data concerning wildfire data in the project area (for more information see Section 5.2).
Frequency of monitoring/recording	Areas burnt must be monitored at least every five years
Value monitored	0 ha, based on the analysis of historical fire events in the area from the MODIS MCD64A1 Version 6.1 Burned Area data product
Monitoring equipment	N/A
QA/QC procedures to be applied	Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or the *IPCC GPG LULUCF 2003*, is recommended.
Purpose of the data	Calculation of project emissions (Forest disturbances - Fire)
Calculation method	N/A
Comments	The applied value at the beginning of the project for areas burned are based on the most recent data available.

Data / Parameter	$A_{dist,i,t}$
Data unit	ha
Description	Area disturbed from pest and disease outbreaks for stratum *i* at time *t*
Source of data	Bibliographic research and *in-situ* monitoring reports

[56] Giglio, L., Boschetti, L., Roy, D. P., Humber, M. L., & Justice, C. O. (2018). The Collection 6 MODIS burned area mapping algorithm and product. Remote sensing of environment, 217, 72-85. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0034425718303705

Description of measurement methods and procedures to be applied	Several studies on world forest resources, as listed in the notes in *Section 4.2*.
Frequency of monitoring/recording	Areas disturbed must be monitored at least every five years
Value monitored	0 ha, from the historic analysis of the project area and from *in-situ* monitoring (see *Section 5.2 – Natural Disturbance, Non-Fire*)
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of project emissions (Forest disturbances – Non Fire)
Calculation method	N/A
Comments	*Ex-ante* estimations of areas disturbed was based on historic incidence of natural disturbance in the Project region. This value is applied according to the most recent data available.

Data / Parameter	A_i
Data unit	ha
Description	Area covered by stratum *i*
Source of data	Geodetic coordinates and/or remote sensing data and/or legal parcel records.
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	Every time each disturbance is recorded during the monitoring period.
Value monitored	Various, see 'project-area-M2-VCS2897' shapefile (in 'Supporting Information/Spatial Information', as disturbances

	were demonstrated as negligible during the current monitoring period
Monitoring equipment	GIS analysis of the project area and disturbance area highlighted during the monitoring period
QA/QC procedures to be applied	N/A
Purpose of the data	Calculation of baseline emissions (strata surface area) and calculation of project emissions (strata surface area)
Calculation method	Not applicable, as no illegal logging occurs during the monitoring period within the project boundary.
Comments	In the baseline scenario strata areas must not change through time. In the project scenario, it must be assumed *ex-ante* that stand boundaries and strata areas must not change through time. *Ex-post* adjustments of the project scenario strata may be needed if unexpected disturbances occur during the project crediting period, severely affecting different parts of an originally homogeneous stratum. This disturbance will be delineated as a separate stratum to monitor the carbon stock changes.

Data / Parameter	PMP_i
Data unit	%
Description	Merchantable biomass as a proportion of total aboveground tree biomass for stratum *i* within the project boundaries.
Source of data	Within each stratum divide the summed merchantable biomass (defined as the total gross biomass of a tree 15 cm DBH or larger) by the summed total of aboveground tree biomass. The calculation are presented in the Excel ‘ ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5, sheet ‘MarketLeakage_PA’
Description of measurement methods and procedures to be applied	The procedures to calculate this parameter are presented in the spreadsheet ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5, sheet ‘MarketLeakage_PA’. The project areas included in this analysis were the Annual Logging Areas (AACs) that would have been logged during

	the monitoring period in the baseline scenario (AAC 5-1 and 5-2)
Frequency of monitoring/recording	Not more than five years
Value monitored	7.69% (for *DHC* stratum) and 5.34% (*S* stratum)
Monitoring equipment	N/A
QA/QC procedures to be applied	Standard quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or the IPCC GPG LULUCF 2003, is recommended
Purpose of the data	Calculation of project emissions
Calculation method	N/A
Comments	*Ex-ante* a time zero measurement must be made of this factor. The timber harvest plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest inventory ($V_{j,i\|BSL}$), based on legal limits.

4.3 Monitoring Plan

Monitoring is required to:

a) Determine changes in forest carbon stocks and greenhouse gas emissions from project activity;

b) Confirm project activity; and

c) Determine changes in forest carbon stocks and greenhouse gas emissions from disturbance and illegal logging (if applicable).

The monitoring plan includes the monitoring of project implementation, the monitoring of actual carbon stock changes from project activities, and the estimation of *ex-post* changes derived from disturbances to the forest. The description of the monitoring plan in the project documents will include the following for each of these monitoring tasks:

a) Technical description of the monitoring task;

b) A list of data and parameters to be collected;

c) Overview of data collection procedures;

d) Quality control and quality assurance procedure;

e) Data archiving; and

f) Organization and responsibilities of the parties involved in all the above.

The monitoring activities are aimed at checking the data reported on the document at the project planning stage. The data collected are therefore intended to confirm the accuracy of what has been reported, both in terms of the data concerning the physical nature of the site and the estimates made through what has been observed by the surveys.

The project proponent (Carbonsink S.r.l., CSG) and the project implementer (Filière Bois, LFB) collaborated for the realization of this monitoring plan and will conduct the monitoring. CSG is responsible for the provision of evidence regarding activity shifting leakage and market leakage. LFB (through the SEFAC group monitoring team) is in charge of the monitoring of disturbances that could occur in the project area (fire, pest and disease outbreaks, illegal logging, and non-productive areas). Together, they will be in charge of collecting, monitoring, and verifying the data to prepare for each verification. Verification events will occur every two to five years. Data related to the variables/parameters listed in Section 4.2 of this document were collected during the monitoring period.

Data archiving and handling of non-conformances

All data collected as part of monitoring will be archived and be kept at least 2 years after the end of the project crediting period. Data archiving will take both electronic and paper forms, and copies of all data must be provided to each project proponent. All electronic data and reports will also be copied on external hard drives and will be stored in multiple locations. All the below-mentioned data are available to VVB for consultation, upon request.

The archives will include:

- Copies of all original field measurement data, laboratory data, and data analysis spreadsheets. Field measurement data are maintained in the Libongo offices of LFB (Boumba and Ngoko department, Cameroon), and are always available for cross-checking. LFB maintains all the relevant documentation related to forest concession, communication with stakeholders, and forest inventory data. Data analysis procedures are instead carried out by CSG, which thus stores this data in their drive systems. During the current monitoring period, no laboratory data were produced under the project, so this type of data is not present in the archive;

- Estimates of the carbon stock changes in all pools and non-CO2 GHG and corresponding calculation spreadsheets. These data are maintained in the data collection system of CSG, and stored in their data systems;

- GIS products. Data related to field monitoring are maintained in the electronic storage system in LFB cartographer offices. Moreover, a copy of those files is always stored in the CSG data collection drive. Other relevant GIS files, such as the supervised classification analysis for illegal logging and burned area analysis, are produced by CSG and thus stored in their data system (jointly with the original remote sensing data used for the analyses); and
- Copies of the measuring and monitoring reports.

Therefore, if non-conformances with a validated monitoring plan arise, the project proponent will be able to access and update the monitoring plan to comply with the satisfaction of the VVB and VCS program officers.

Monitoring and Quality assurance/Quality control (QA/QC) of project implementation

Information is provided, and recorded in the monitoring report, to establish that:

- The geographic position and coordinates of the project boundary (and any stratification inside the boundary) are established, recorded, and archived. This has been and will be done by using geo-referenced spatial data (e.g. maps, GIS datasets, aerial photography, or geo-referenced remote sensing images);
- Commonly accepted principles of forest inventory and management are implemented;
- Standard operating procedures (SOPs) and quality control/quality assurance (QA/QC) procedures for forest inventory including field data collection and data management will be applied. SOPs already applied in national forest monitoring or available from published handbooks or the IPCC GPG LULUCF 2003 will be used. For any activities related to forest inventory, the Cameroonian national guidelines are followed as SOPs. In particular, the following reference documents will be followed for forest inventory SOPs[57]:
    - ONADEF, 1991. Normes d'Inventaire d'Aménagement Et De Préinvestissement;
    - ONADEF, 1995. Normes d'Inventaire d'Exploitation;
    - MINFOF, 2016. Décision N°0546/AMINFOF/SG/DF/CI/SDIAF Du 05 Octobre 2016 Rendant Exécutoire Les Directives d'Inventaire D'exploitation
    - MINFOF, 2019. Décision n° 536/D/MINFOF/SETAT/SG/DF/SDIAF du 23 Juillet 2019 Rendant exécutoires les directives d'inventaire d'aménagement

[57] A copy of these guidelines/regulations can be found in the 'Laws/ Forest inventory Cameroon SOPs' folder

et de préinvestissement intégrant les spécificités de biodiversité pour les forêts de production du domaine forestier permanent du Cameroun;

During the following monitoring period, no activities related to forest inventory were carried out in the project area. The forest inventory for the UFA 10-064 concession was carried out in 2005, before the formulation of the forest management plan[58];

- The project plan, together with a record of the plan as implemented during the project, shall be available for verification (and/or baseline re-assessment) as appropriate.

Stratification

The VCS VM0010 methodology v1.3 requires that an *ex-ante* stratification of the project area in the project scenario is described in the project documents as documented in the timber harvest plan or developed by the project proponent through sampling in the project area. For the project area, forest stratification has been carried out during the UFA 10-064 forest inventory (presented in Sections 1.13 and 3.4 of the Joint Validation and Verification document of this project). The subdivision of the project area in strata was done according to the forest types of the UFA 10-064[59], identified with the classification Letouzey's method for vegetation types[60].

The primary *DHC* stratum includes vegetation types characterized by the presence of dense moist forests, including windbreak, and high- and low-density forests. The secondary *S* stratum brings together all the areas populated by high- and low-density adult secondary forests and low-density young secondary forests.

The last forest strata come from hydromorphic soils. These include permanent (*MIP*) and temporarily (*MIT*) flooded areas, the latter falling within the productive zone of the forest, and Raphia forest (*MRA*). The extension of the hydromorphic soil strata was not considered in the project area due to their swamped or permanently flooded conditions. However, the *MIT* stratum meets the legislative requirements to be exploited for logging, as it does not fall within the permanently flooded areas, and therefore it was yearly logged by LFB according to the 2005 Forest Management Plan of UFA 10-064. According to the Ramsar Convention[61], wetlands are "areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of

[58] For a report on this forest inventory, see the 'R.I.A. 2006.pdf' document in "Supporting Information/Previous Validation and Verification Documents"

[59] Table 3.1 of UFA 10-064 Management Plan, pp.16

[60] Letouzey R., 1985. Notice de la carte phytogéographique du Cameroun au 1 : 500 000 (1985). Institut de la carte de la végétation, Toulouse, France

[61] Ramsar, 1971. Convention on Wetlands of International Importance especially as Waterfowl Habitat.

marine water, the depth of which at low tide does not exceed six meters". Moreover, IPCC[62] defines wetlands as land covered or saturated by water for all or part of the year that does not fall into the forest land, cropland, grassland, or settlements. As for the applicability condition regarding wetlands in VM0010 methodology v1.3, MIT could be not included in the project area. The project proponent thus did not consider the MIT areas in the calculation of carbon benefits that arise from forest conservation in these areas. However, due to the project implementation, the forest stratum in MIT will not be logged and the project will thus act indirectly on wetland conservation in the UFA 10-064 area. Therefore, as reported in Figure 6, the project area was divided into two strata:

- Primary (*DHC*) stratum; and
- Secondary (*S*).

The shapefile of the stratification of the project area is available to the VVB.

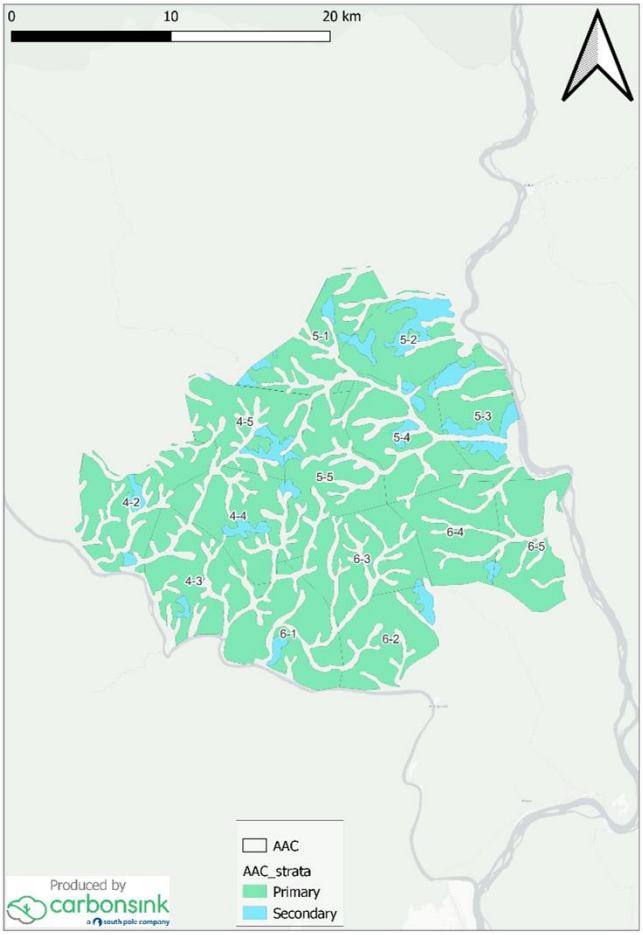

Figure 6: Project area stratification

[62] IPCC, 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry, Section 3.5 "Wetlands"

Monitoring of actual carbon stock changes from project activities

Since the accounting of actual stock changes for the ongoing forest growth during the project scenario was not taken into account, as a conservative choice (see Section 4.2 of the Joint Validation and Verification document for this project), no monitoring of actual stock changes in forest is needed. However, *in-situ* annual patrols and remote sensing analysis are put in place to verify the absence of illegal activities (e.g. illegal logging, poaching, and illegal mining) and natural disturbances (e.g. wildfires, pests and diseases, …) in the project area.

Changes in forest carbon stocks and greenhouse gas emissions from disturbance and illegal logging

Project area permanent access points control and *in-situ* monitoring patrol

As a Cameroonian State forest, national legislative references require concessionaires (Filière Bois, in this case) to set up facilities to control entry and exit from the forest, along the main route at the two access points. This requirement is necessary to counteract any illegal removals from the forest, such as poaching and illegal logging. This is required by Order 222 MINEF of 25 May 2002, Article 11(3), and taken from the Forest Management Plan, approved by MINFOF, concerning forest control devices, Chapter 4.8.7. LFB installed permanent observation points at key access points[63], north and south of UFA 10-064 (the two access points, to control the access to the project area. On the field, it takes the form of a level crossing. The southern access is managed by the local Farmer Forestry Committees *(Comité Paysans Forêt, CPF)* of Socambo/Mongokélé[64]. Registries of entry/exits from the area are maintained by the local communities participating in the monitoring activity; the monitoring log and registries are managed manually and photographic evidences are provided to the VVB and Standard for consultation.

The northern access of the UFA 10-064 is instead monitored by the forest rangers (under the MINFOF responsibility), in collaboration with the Lobéké Park, at the control point PK27: this access point is located just below the Lobéké Park southern access and is the closest access point to the UFA 10-064 northern entry point. People who want to access the forest concession are inspected for illegal instruments to carry out illegal activities and for other resources illegally trafficked outside the UFA 10-064 concession. Their role is also to participate in illegal activities patrolling in the nearby area: people who are caught in carrying out illegal activities are handed over to local authorities for trial. Moreover, the Lobéké Park maintain a remote registry access of the park by using cameras: data from these registries can be requested from the PP for consultation (these data are maintained and property of Lobéké Park, which will share with LFB those data).

[63] Supporting Information/Monitoring Documents/Strategies LAB – Anti-poaching activities (2020)

[64] Supporting Information/Monitoring Documents/PROTOCOLE D'ACCORD CPF Socambo-Mongokélé

Moreover, an *in-situ* monitoring patrol is carried out each year on the forest borders, to gather information on the illegal activities located in the project area. This monitoring is carried out by the LFB/SEFAC monitoring team. Each patrol aims at recording observations (location, description, pictures) of human activity and disturbances, particularly about illegal logging, fires, conversion, poaching, illegal camping sites, etc. A monitoring report is produced after a patrolling survey (these documents are provided to the Auditor/Standard during the verification process).

The materials required for each patrolling survey are:

- Pick-up vehicle;
- GPS tracking system;
- Machetes, sharpening files, sleeping equipment, kitchenware
- Maps of areas/limits to be monitored, notepads, and document holders.

Data collection in the field involves the use of a monitoring team to patrol the AACs supposed to be exploited in that year and the areas identified as sensitive within the UFA. The sensitive areas were identified through a joint study in 2019 with the CRESA (Centre Régional d'Enseignement spécialisé en Agriculture, Forêt Bois - CRESA).

<u>QA/QC for the monitoring policies</u>

The monitoring of annual logging areas (AACs) is included as mandatory within the UFA's Management plan as indicated by Cameroonian law 94/01 (defining forest management practices) and framework law 96/12 (regarding the management of the environment). Monitoring practices are described in the LFB internal manual[65] for the control of illegal activities related to the disturbance of flora and fauna within the UFA. This document outlines the practices for the correct identification of illegal activities within the area to be monitored and is available to the Auditor for consultation. The division of tasks and responsibilities of the project area monitoring is set out in the diagram below (Figure 7).

[65] Supporting Information/Monitoring Documents/Strategies Lutte Activites Illegales SEFAC 2020

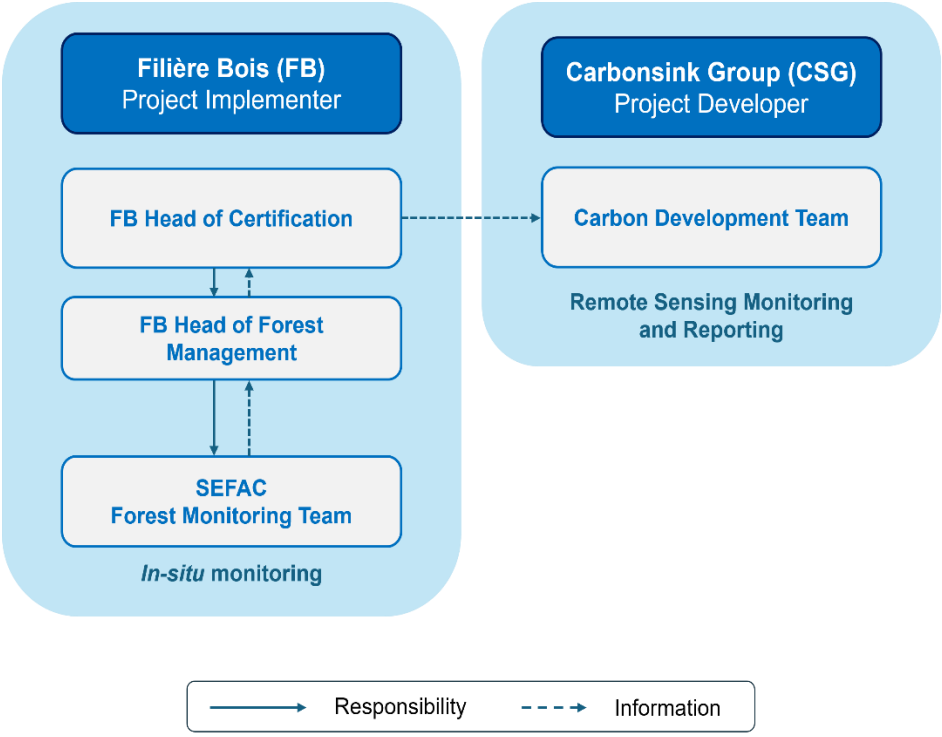

Figure 7: Organizational structure of the monitoring activities

The head of forest management is entrusted to organize the monitoring patrols, along with the monitoring team leader (who is part of SEFAC field technicians). Monitoring teams are generally composed of[66]:

- 1 monitoring team leader;
- 1 orientation responsible;
- 3 choppers;
- 2 porters;
- 1 cook.

Training on field data collection for the personnel is entrusted to the Head of Forest Management (M. Renée Gweth Likaa) and the monitoring team leader, who explains to technicians what parameters to report and how to identify signs of illegal activity. The team leader has also the responsibility for the oversight and accountability of monitoring activities. This activity is carried out annually, to train the team on the importance of collecting data in a unique, correct, and compliant manner, so that data can be compared between years. The *in-situ* monitoring activities for the project area are carried out on the Southern border and Western one of the UFA 10-064, which were identified as the areas with the highest risk of

[66] For more information, see the annual monitoring reports, available to the Auditor

illegal activities[67]. In-situ patrolling is one part of the monitoring activities (together with remote sensing) to verify the absence of illegal activities and fire occurrences, while the presence of pests and diseases is only verified with in-situ patrolling. Each monitoring patrol starts with a check of the equipment required to carry out measurements and field checks. Technicians must check for the condition of writing instruments (notepads, pens), and must control the GPS device, the condition of the batteries, the correct sharpening of machetes, and the condition of safety boots, and camping equipment. This activity is supervised by the team leader. The monitoring team proceeds then to sieve the hunting tracks, looking for traces of illegal activity, such as marks on vegetation, traps, rifle cartridges, signs of the encampment, etc. When evidence of illegal activity is found, the event is described in the notepad, photos are collected for the area, and GPS coordinates are collected. Then, coordinates are written down in the notepad, with the illegal activity plus other details/or comments (e.g. extension of it or any other comment). At the end of the monitoring mission, all these records are copied into the GIS system of LFB manually. Data gathered are entered into the monitoring report, prepared by the team leader to report all illegal events that have been reported in the area. This report must be checked by the Head of Forest Management, who once validated, submits it to the local forest guard (*chef de poste forestier*), to proceed with the reporting of any illegal activities. Even though the risk of fire, pests, and plant disease is low in the project area, recurrent training will be planned during the project implementation to update personnel on the data collection and reporting of these disturbances.

Remote Sensing analysis of annual illegal logging activities

Remote sensing with processed satellite imagery data is used to identify and track the presence and significance of illegal logging activities in the whole project area. The methodology used for spatiotemporal remote sensing data analysis is initially presented in Section 3.2.1 of this document. Cartographic information from the supervised classification of satellite images of Sentinel-2A (2022-2023) to identify Forest and Non-Forest areas. The analysis is based on supervised remote-sensing techniques to generate classes such as Forest, Non-Forest, and Water. The identification of these classes at different temporal instants aims to identify areas that are potentially impacted by illegal logging activities during the considered period. The training areas of each group are randomized and are assigned to the satellite image via interpretation performed by an expert in geospatial solutions and with a minimum registration of 40 points per class. This methodology is specifically crafted for the project area, with high spatial accuracy (10-m for Sentinel 2-A). The output of this analysis is then associated with the area potentially impacted by illegal logging (A_{dist_Li}). The total influence of potential illegal logging is then tested for significance over the entire project area with the application of the CDM Tool for significance[68]. The methodology VM0010 v1.3

[67] These areas were identified in the study 'Strategies Lutte Activites Illegales SEFAC 2020 .pdf', provided in the 'Supporting Information/Monitoring Documents' folder

[68] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-04-v1.pdf

(Section 8.2) states that illegal logging below de minimis should be considered negligible, following the rule set up in the VCS AFOLU Requirements (VCS Methodology Requirements v4.2). This document states that a specific project or leakage GHG emissions source "may be deemed de minimis and do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than five percent of the total GHG benefit generated by the project". If the illegal logging in the project area spotted during the monitoring period appears to be significant, Option B (limited and permanent sample plots) of Section 8.2.2.2 of the VCS VCM0010 methodology will be put in place in the concerned area by the project proponent.

Remote Sensing analysis of natural disturbances related to wildfires

Remote sensing analysis with processed satellite imagery data is used to identify and assess the impact of the occurrence of wildfire on the carbon stock change in the project area and its significance. This analysis is used to identify the burned area during each monitoring period ($A_{burn,i,t}$). The burned areas analysis is performed with mapping information from the MCD64A1 product, version 6, from the Moderate Resolution Imaging Spectroradiometer[69] (MODIS) dataset, developed by the Department of Geography at the University of Maryland (Giglio et al., 2009). The MCD64A1 product is organized as a grid of 35 columns and 17 rows covering the entire world, with a spatial resolution of 500 m. The MODIS burned area product (MCD64A1) employs a model that integrates MODIS spectral image data in the near-infrared range (bands 5 and 7) and constructs the combustion-sensitive vegetation index (VI). The model delivers an image with the burned-area surface and gives to each cell (pixel) of 500 m the original date of the calendar year in which the burning took place. To perform the analysis of the burned areas for the project, data are downloaded from the United States Geological Survey (USGS) through the EARTHDATA web portal[70]. The raster layers of the date of burning, uncertainty about the date of burning, and quality assurance (QA) for each month of the monitoring period. The burning surface area during the project monitoring for all the project areas is thus estimated. Methodological steps and results are presented in the '240201_IFM-Cameroon_Burned area analysis_MODIS_2022-2023' document[71].

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

[69] https://modis-fire.umd.edu/index.html

[70] https://lpdaacsvc.cr.usgs.gov/appeears/task/area

[71] Located in 'Supporting Information\Monitoring Documents'

5.1 Baseline Emissions

In this section, the baseline emissions and removals are quantified for the 2022-2023 monitoring period (01/01/2022 to 31/12/2023)[72,73]. Calculations can be retrieved in the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5' spreadsheet. The values for these calculations were taken from the 'ExAnte_BoumbaAndNgoko-VCS2897_VM0010_v4'[74] and referred to the current monitoring period (2022-2023). The values of the GHG emissions and removals for the baseline scenario during the monitoring period were expressed in tCO_{2e} for each project stratum area.

The calculation of baseline emissions was carried out as described in the VM0010 v1.3 methodology from *Section 8.1.1* to *Section 8.1.6*. Baseline projections are calculated ex-ante and are not adjusted throughout the project's lifetime. As described, the equations in *Section 8.1.1* are dedicated to estimating the calculation of carbon in commercial timber. The next estimation required by the methodology in *Section 8.1.2* relates to residual dead wood in the forest from logging slash (a), standing trees damaged during the harvest of other trees (b), and residual wood material from the realization of infrastructures required for logging activities (c). *Section 8.1.3* deals with the calculation of carbon sequestered by wood products made from harvested wood, according to the category of product made: short-life or long-life cycle. Then, in *Section 8.1.4*, the carbon sequestered by forest regrowth after logging operations is considered. *Section 8.1.5* assesses the part due to emissions from the use of fossil fuels for all cutting, skidding, loading, transport, hauling, and processing operations from the machinery used in the project area and from the factory machinery. As deemed conservative, the emissions related to the latter components were not considered in the baseline scenario and are thus not accounted. Finally, *Section 8.1.6* provides the net amount of carbon in the baseline scenario from the factors calculated with previous equations.

It is recommended to read the following sections in conjunction with the Excel document named 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5'. This spreadsheet has been made available to VVB.

Calculation of carbon stocks in commercial timber volumes

These equations were used to quantify the commercial volumes present within the project area. The complete explanation was presented in the validated PD and MR of the project (publicly available in the VERRA Registry). The value of the extractable volumes of wood in the project area for the baseline scenario was calculated from the Forest Inventory and the

[72] Supporting Information/Attestation de Non Activité/MINFOF Attestation de non activité - 2020-002176

[73] Supporting Information/Attestation de Non Activité/MINFOF Attestation de non activité - 2022-000787

[74] Available in the folder "Previous Validation and Verification Documents"

Forest Management Plan of the UFA 10-064. The assumptions and calculations can be verified in the 'ExtractableVolumes_Project_UFA1064-VCS2897'[75] spreadsheet. These values were calculated for the whole project area and validated previously. Carbon stocks in commercial timber volumes were thus calculated during the validation of the project and were not calculated again for the current monitoring period. For more information and a complete list of equations and calculations, see reference documentation, i.e. the validated and verified project document, Section 4.1, and the "ExAnte_BoumbaAndNgoko-VCS2897_VM0010_v4" spreadsheet.

Calculation of dead wood (logging slash) generated in the process of timber harvest

This section calculates $\Delta C_{DWSLASH,i,p|BSL}$, the change in carbon stock in dead wood resulting from timber harvest in stratum *i* in land parcel *p*, using $C_{EX,j,i|BSL}$ and $C_{HB,j,i|BSL}$ (Equation and 4 of the VM0010 v1.3 methodology). These values were calculated for the whole project area and validated previously. These values were not calculated again for this monitoring period, and are available in the "ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5" spreadsheet ("BSL_ExPost" sheet).

Calculation of baseline carbon sequestered in wood products

This section calculates the net carbon stock change resulting from wood product conversion and retirement. In all cases where wood is harvested for conversion to wood products, carbon stock in the wood products pool must be included in the baseline case. Carbon stocks treated here are those stocks entering the wood products pool at the time of harvest. These values were not calculated again for this monitoring period, as always validated previously by the VVB and VERRA. These values are available in the "ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5" spreadsheet ("BSL_ExPost" sheet).

Change in carbon stocks due to forest regrowth after harvest

The carbon sequestration in the baseline scenario resulting from forest regrowth after timber harvest up to year t is equal to the forest regrowth rate of each stratum. As already validated, the regrowth rate was calculated from the IPCC default values for above-ground net biomass growth in African tropical moist deciduous forest in Africa, considering a young secondary forest for the whole project area (conservative assumption). The calculations leading to this parameter can be found in the 'Bibliography' in the "ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5" spreadsheet ("BSL_ExPost" sheet). The total forest regrowth in the PA during the monitoring period is presented below.

Calculation of baseline emissions from the combustion of fossil fuels in forestry and wood processing machinery

[75] Available in the folder "Previous Validation and Verification Documents"

As validated previously, the PP has decided not to account for baseline emissions from the combustion of fossil fuels in forestry and wood processing machinery. This measure is deemed conservative. Therefore, Equations 13-22 of the VM0010 methodology v.1.3 were not used in the present project and are not presented here.

Calculation of baseline scenario greenhouse gas emissions from change in carbon stocks

This section calculates $GHG_{NET|BSL}$, the net greenhouse gas emissions in the baseline scenario for the current monitoring period, Calculations can be retrieved in the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5' spreadsheet, 'BSL_ExPost_total' sheet. The transformation to total GHG emissions and removals in each year of the current monitoring period (2022-2023) was estimated through the surface area of the planned timber harvest schedule (for each forest stratum), which is presented in the '*Areas_TimberHarvestSchedule*' sheet. The net carbon stock change to be converted to emissions is equal to the carbon stock change as a result of timber harvest plus the carbon stock change resulting from conversion and retirement of wood products minus carbon sequestration from forest regrowth after harvest. To generate the annual carbon stock change in the baseline scenario, the total net change in carbon stocks for parcels was multiplied by the area of forest in the particular age class (i.e., years since harvest in the baseline), estimated in the '*Areas_TimberHarvestSchedule*' sheet. The annualized calculations vary between years 1, 2-10, 11-20, and all years since the start of the project activity, depending on which decay functions apply.

Therefore, the net change in carbon stock from wood products and logging slash across all parcels within the first year of harvest in the baseline was calculated as:

$$\Delta C_{NET|BSL(1)} = \sum_{i,p} A_{1,i,p} * \sum_{i=1}^{M} \left(\Delta C_{DWSLASH,i,p|BSL}/10\right) + \Delta C_{WP0,i,p|BSL} + \left(\Delta C_{WP100,i,p|BSL}/20\right) \quad (23)$$

$\Delta C_{NET\|BSL(1)}$	Net change in carbon stock across all parcels in the baseline scenario in the first year since harvest in the baseline scenario, in tC;
$\Delta C_{DWSLASH,i,p\|BSL}$	Change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum *i* in land parcel *p*, in tC · ha^{-1};
$\Delta C_{WP0,i,p\|BSL}$	Change in carbon stock resulting from wood product conversion and retirement from stratum *i* in land parcel *p*, that is assumed to be emitted in the first year of harvest in the baseline tC · ha^{-1};
$\Delta C_{WP100,i,p\|BSL}$	Carbon stored in wood products that is assumed to be retired between 3 – 100 years after harvest from stratum *i* in land parcel *p*, tC · ha^{-1};
$A_{1,i,p}$	Area of stratum *i* in land parcel *p* that was harvested 1 year ago, ha;

i	1,2,3...*M* strata; and
p	1,2,3…P land parcels harvested within the project crediting period.

The net change in carbon stock from wood products and logging slash across all parcels in the years 2 – 10 since harvest in the baseline was then calculated as:

$$\Delta C_{NET|BSL(2-10)} = \sum_{i,p} A_{2-10,i,p} * \sum_{i=1}^{M} \left(\Delta C_{DWSLASH,i,p|BSL}/10\right) + \left(\Delta C_{WP100,i,p|BSL}/20\right) \quad (24)$$

Where:

$\Delta C_{NET\|BSL(2-10)}$	Net change in carbon stock across all parcels in the baseline scenario in years 2-10 since harvest in the baseline scenario, in tC;
$\Delta C_{DWSLASH,i,p\|BSL}$	Change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum *i* in land parcel *p*, in tC · ha^{-1};
$\Delta C_{WP100,i,p\|BSL}$	Carbon stored in wood products that is assumed to be retired between 3 – 100 years after harvest from stratum *i* in land parcel *p*, tC · ha^{-1};
$A_{2-10,i,p}$	Area of stratum *i* in land parcel *p* that was harvested between 2 and 10 years ago, ha;
i	1,2,3...*M* strata; and
p	1,2,3…P land parcels harvested within the project crediting period.

The net change in carbon stock from wood products across all parcels in the years 11-20 since harvest in the baseline was calculated as:

$$\Delta C_{NET|BSL(11-20)} = \sum_{i,p} A_{11-20,i,p} * \sum_{i=1}^{M} \left(\Delta C_{WP100,i,p|BSL}/20\right) \quad (25)$$

Where:

$\Delta C_{NET\|BSL(11-20)}$	Net change in carbon stock across all parcels in the baseline scenario in years 11-20 since harvest in the baseline scenario, in tC;
$\Delta C_{WP100,i,p\|BSL}$	Carbon stored in wood products that is assumed to be retired between 3 – 100 years after harvest from stratum *i* in land parcel *p*, tC · ha^{-1};
$A_{11-20,i,p}$	Area of stratum *i* in land parcel *p* that was harvested between 11 and 20 years ago, ha;
i	1,2,3...*M* strata; and
p	1,2,3…P land parcels harvested within the project crediting period.

The net change (sequestration) in carbon stock due to forest regrowth across all parcels in all years since harvest in the baseline scenario is calculated according to Equation 26 below.

$$\Delta C_{NET|BSL(1+)} = \sum_{i,p} A_{t^*} * \sum_{i=1}^{M} \left(-\Delta C_{RG,i,p|BSL}\right) \quad (26)$$

Where:

$\Delta C_{NET\|BSL(1+)}$	Net change in carbon stock due to forest regrowth in all parcels that have been harvested in the baseline scenario, in tC;
$\Delta C_{RG,i,p\|BSL}$	Carbon sequestration resulting from forest regrowth after timber harvest in stratum i in land parcel p, tC · ha^{-1};
A_{t^*}	Cumulative area harvested until time t^*, ha;
t^*	1, 2,….10, time elapsed since the start of the project, in years;
i	1,2,3...*M* strata; and
p	1,2,3…P land parcels harvested within the project crediting period.

Finally, the net change in carbon stock across all parcels harvested over each year of the project crediting period in the baseline scenario since the start of the project activity was calculated from the previous equations:

$$\Delta C_{NET|BSL,t^*} = \sum_{p=1}^{P} [\Delta C_{NET|BSL(1)} + \Delta C_{NET|BSL(2-10)} + \Delta C_{NET|BSL(11-20)} + \Delta C_{NET|BSL(1+)}] \quad (27)$$

The net carbon stock change in the baseline scenario calculated in Eq. 27 was then converted to net greenhouse gas emissions:

$$GHG_{NET|BSL,t^*} = \Delta C_{NET|BSL,t^*} * {}^{44}/_{12} \quad (28)$$

Where:

$GHG_{NET\|BSL,t^*}$	Net greenhouse gas emissions in the baseline scenario in the year t^* since the start of the project activity, tCO_2e;
$\Delta C_{NET\|BSL,t^*}$	Net change in carbon stock across all parcels in the baseline scenario in the year t^* since the start of the project activity, tC;
${}^{44}/_{12}$	1, 2,….10, time elapsed since the start of the project, in years;

The total greenhouse gas emission derived from the *baseline scenario during the monitoring period was* equal to *596,728 tCO_2e.* A table with the summary of the calculations for the total

GHG emissions and removals in the baseline scenario is attached below (Table 2); for explanatory purposes, the first verification period (2018-2021) is also included here.

Table 2 Baseline emission values (from the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5)

Monitoring Period	*Project year*	$\Delta C_{NET\|BSL(1)}$	$\Delta C_{NET\|BSL(2-10)}$	$\Delta C_{NET\|BSL(11-20)}$	$\Delta C_{NET\|BSL(1+)}$	$\Delta C_{NET\|BSL,t*}$	$GHG_{NET\|BSL,t*}$
	year	**tC**	**tC**	**tC**	**tC**	**tC**	**$tC0_2e$**
1st verification	2018	28,342	0	0	-1,483	26,859	98,484
	2019	28,747	14,638	0	-2,882	40,503	148,510
	2020	26,656	29,485	0	-4,293	51,848	190,110
	2021	26,367	43,252	0	-5,751	63,868	234,181
	Total	**110,112**	**87,375**	**0**	**-14,409**	**183,078**	**671,285**
2nd verification	2022	24,586	56,869	0	-7,087	74,367	272,679
	2023	27,837	69,566	0	-9,026	88,377	324,049
	Total	**52,423**	**126,434**	**0**	**-16,113**	**162,744**	**596,728**

5.2 Project Emissions

The calculations are presented in the 'PRJ-ExPost' sheet of the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5. Since PP decided to not account for forest growth of undisturbed forests (considered as a conservative assumption), carbon removals in the project scenario were set to zero. Calculations for project emissions are presented below.

Forest disturbance in the project scenario

Natural disturbance

This section calculates $\Delta C_{DIST_FR,t|PRJ}$, the carbon stock change due to fire disturbance in the project scenario (in tCO_2e), and $\Delta C_{DIST,t|PRJ}$, the carbon stock change due to non-fire natural disturbance in the project scenario (in tCO_2e). In this section, it is requested to include any estimated contribution to the GHG emissions balance in the project scenario. Disturbance due to fire is discussed in Option A, and all non-fire natural disturbances (e.g. wind, disease, pest events) are discussed in Option B.

Option A - Fire

The complete methodology and the results of the remote sensing analysis of MODIS burned area during the monitoring period 2022-2023 are presented in the document '240201_IFM-Cameroon_Burned area analysis_MODIS_2022-2023'[76]. No burned area was identified in the project area during this monitoring period, so $A_{burn,i,t}$ is zero. Thus, no emissions related to forest fires are considered during the 2022-2023 monitoring period. Moreover, monitoring reports made by the implementation partner didn't identify any presence of fire in the monitored portion of the UFA 10-064 forest concession[77].

Option B - Pests and diseases

Where non-fire natural disturbances occur ex-post in the project area, the area disturbed will be delineated. Natural tropical forests, such as the one that covers the project area, are considered stable ecosystems and are free from pest outbreaks[78]. Moreover, the increase in pests of forest plants occurs mainly in forests with a low biodiversity index, such as planted forests[79]. Literature studies point out that the incidence of logging if carried out over large areas, makes the stand *sui generis* more vulnerable to pests and diseases in forests[80]. *In-situ* monitoring carried out by LFB didn't identify any presence of pests and diseases in the monitored area of the UFA 10-064 forest concession[81].

Illegal logging

The analysis of remote sensing calculations to identify the potential illegal logging sites during the 2022-2023 monitoring period is presented in the "240218_Supervised_Classification_IFM_Cameroon" document[82]. The map of the areas identified by the abovementioned analysis is presented in Figure 8. The methodology is presented in Section 3.6 of the PDD[83].

[76] Located in the 'Supporting Information/Monitoring Documents' folder

[77] Located in the 'Supporting Information/Monitoring Documents/Monitoring Reports' folder

[78] Nair et al. (1986). A study of insect pest incidence in natural forest. Research Paper 44. KFRI, Peechi, India.

[79] Foahom, B. (2002) Insect pest incidence on timber tree species in natural forest in south Cameroon. Tropenbos-Cameroon Programme, ISSN 1566-2152 (pag.40)

[80] Way, M.J. (1977). Pest and disease status in mixed stands vs. monocultures: the relevance of ecosystem stability. In: Cherret, J.M. and Sagar, G.R. (eds.). Origins of pest, parasite, disease and weed problems. Blackwell Scientific Publications, Oxford, United Kingdom.

[81] Located in the 'Supporting Information/Monitoring Documents/Monitoring Reports' folder

[82] Located in the 'Supporting Information/Monitoring Documents' folder

[83] Referring to Forest Conservation in Boumba-et-Ngoko (Version 4.1.), issued on 17 July 2023; section 3.6. Methodology deviations (Illegal logging monitoring (project scenario GHG emissions)

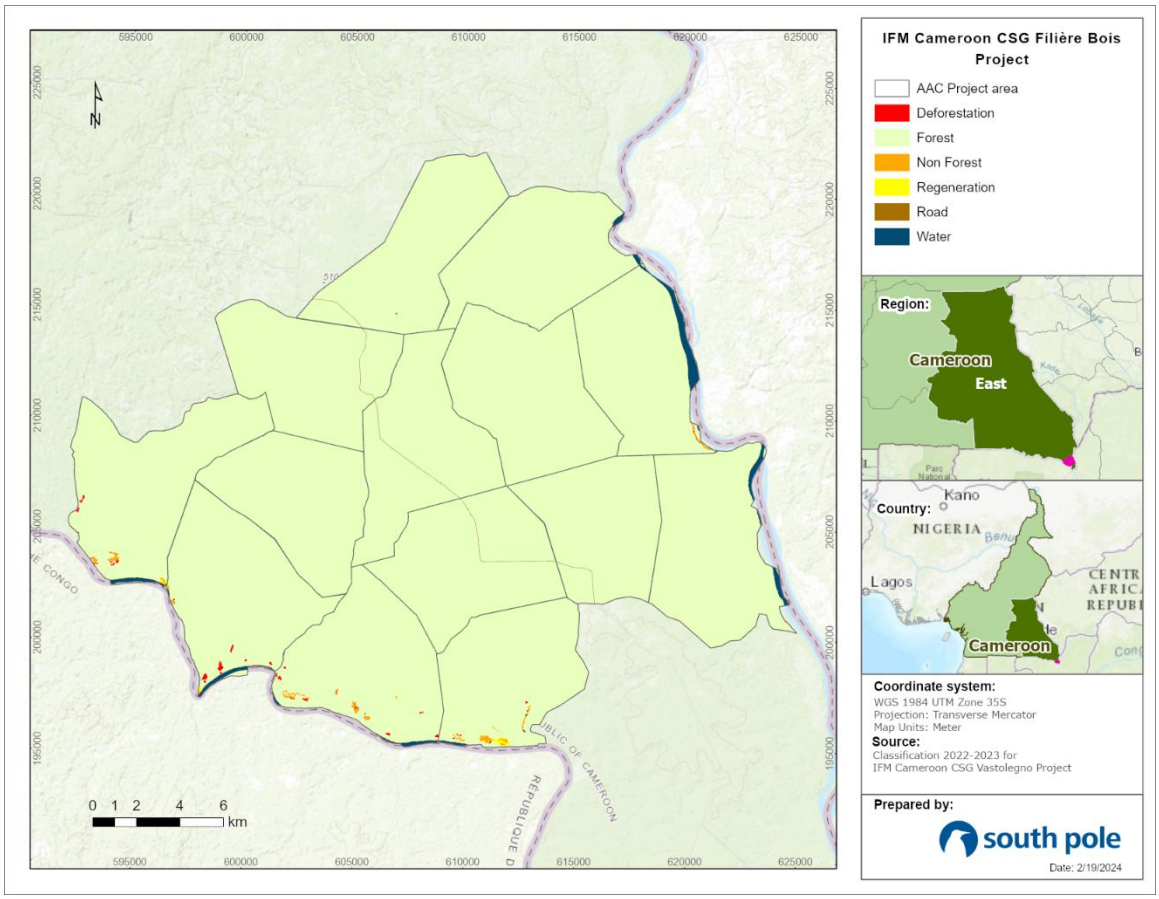

Figure 8 Maps with the results of the supervised classification of Sentinel 2-A data used to identify potential illegal logging areas inside the UFA 10-064 AACs covering the project area during the 2022-2023 monitoring period

A total of 19.1 ha were identified as impacted by illegal logging during the monitoring period in the entire project area, located inside the UFA 10-064. However, for the sake of conservativeness, the entire area of AACs covering the project area was considered for the presence of illegal logging (see Figure 4). This illegally logged area corresponds to around 0.1% of the total project area (37.4 ha over 38,309 ha). To increase the conservativeness of this analysis, LFB carried out *in-situ* monitoring activities on the monitored area borders that were identified as the most sensitive/sensible for illegal activities[84], including illegal logging. Reports of these monitoring activities during the monitoring period are presented to the Auditor/Standard[85]. *In-situ* monitoring resulted in traces of illegal logging activities, particularly regarding human settlements for poaching and illegal logging traces. Subsistence agricultural activities and the presence of illegally logged trees spotted during

[84] Evidence in 'Supporting Information/Monitoring Documents/', 'Analyse Du Niveau De Risque Des Activités Illégales Dans Les Ufa Sebac-Filière Bois' and 'Strategies Lutte Activites Illegales SEFAC 2020' documents

[85] Located in 'Supporting Information/Monitoring Documents/', 'Rapport Annuel de Surveillance des Activités Illégales 2022' and 'Rapport Annuel de Surveillance des Activités Illégales 2022'

in-situ monitoring were considered to calculate the total extent of illegal logging during the monitoring period. The extent of illegal agricultural fields was estimated in the field by the monitoring team; for the potential area covered by illegal activities, it was conservatively assumed that each observation point corresponds to a surface area of 0.1 ha. The total surface covered by these disturbances related to illegal logging amounts to 4.4 ha (see 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5' spreadsheet for calculations). The *in-situ* monitoring reports are provided as evidence to the VVB and Standard for verification purposes. So, the total area conservatively covered by potentially illegal logging activities amounts to 37.4 ha. This corresponds to about 0.1% (0.098%) of the total project area.

This area potentially covered by illegal activities was thus used to estimate the net carbon stock changes as a result of illegal activities, starting from Equation 37 of the VM0010 v1.3 methodology. Calculations are made available to the VVB and the Standard in the sheets 'PRJ_Illegal_Logging' and 'PRJ_ExPost' of the *ex-post* estimates spreadsheet. Several assumptions were considered in the calculation of this variable:

- For conservativeness, the total areas potentially covered by illegal activities were used (i.e. 37.4 ha, mentioned above), including both the project area and the areas of the forest concessions covered by hydromorphic soils (see Figure 8 and sheet 'PRJ_Illegal_Logging' in the *ex-post* calculations spreadsheet);
- It was also assumed that all the biomass in those areas would have been lost: this is highly conservative, as the logging activities in the area are not based on clear-cut, but just some trees since the majority are logged under artisanal logging to provide fuel wood (main energy source where the level of connection to the electricity grid is absent) and construction materials[86]. Moreover, it was assumed that disturbance happened in the primary forest stratum, which has a higher biomass density. It was thus considered that the biomass removed through illegal logging is equal to the IPCC default value for forest aboveground biomass, for Primary Tropical Moist Deciduous Forest in Africa (236.6 t d.m./ha from Table 4.7, IPCC 2019, Volume 4, Chapter 4). To ensure conservativeness, we compare this value with aboveground biomass estimates from similar forests that share key characteristics with those in the project area. From the report of the national forest inventory of Cameroon conducted by MINFOF and FAO (2005)[87] the value of 292.7 t d.m./ha was estimated for the aboveground biomass in the forest zone for Cameroon. Another study, from Zapfack et al. (2013)[88], reports aboveground biomass values of 263.3 t d.m./ha for primary forest stratum and 252.5 t d.m./ha for secondary

[86] https://climatefocus.com/publications/regional-assessment-2022-tracking-progress-towards-forest-goals-in-the-congo-basin/

[87] MINFOF., FAO., 2005. Evaluation Des Ressources Forestières Nationales Du Cameroun. Unité Technique du Projet d'Inventaire forestier national en collaboration avec la FAO, Yaounde, Cameroun.

[88] Zapfack, L., Noumi, V. N., Kwouossu, D. P., Zemagho, L., & Nembot, F. T. (2013). Deforestation and carbon stocks in the surroundings of Lobéké National Park (Cameroon) in the Congo Basin. Environment and Natural Resources Research, 3(2), 78

forest stratum in the Lobeke National Park, located north of the UFA 10-064 concession. Following this analysis, it is clear that the IPCC value is not the most conservative one: it was thus decided to use the most conservative value of 292.7 t d.m./ha for the aboveground biomass. This value was then transformed into an equivalent mass of carbon for calculation of the potential emissions from illegal activities;

- The areas potentially covered by illegal activites were mainly identified using a remote sensing approach. Supervised classification was carried out considering data that encompassed the whole monitoring period (e.g. 01/01/2022-31/12/2023), as a unique time interval (see above). Since illegal logging emissions need to be calculated annually, we assumed that the estimated areas where illegal activities occurred (i.e. 37.4 ha) were covered by illegal activities at 50% in 2022 (i.e. 18.7 ha) and 50% during 2023.Detected deforestation was thus assumed to happen proportionally in each monitoring year (e.g. 50% in 2022 and 50% in 2023);
- The parameters associated with the combustion of fossil fuel (C_FUEL) and the mean volume of extracted timber for forestry infrastructure (V_Ex,inf,BSL) were not used in the calculation of illegal logging emissions since they were already conservatively excluded from the calculation of the baseline emissions. Indeed, emissions related to infrastructure and fossil fuel use were conservatively not accounted for in the definition of the baseline scenario. This can be verified in the validated PD and first monitoring report of the project (2018-2021). These factors were thus not presented as 'Data and Parameters Available at Validation' and will not be mentioned in the following sections. These parameters were not calculated and conservatively excluded in the calculation of baseline emissions; to be consistent with this assumption, they were thus also excluded from this calculation.

Under these assumptions the value estimated as the net stock change in carbon related to the potential illegal disturbances during the 2022-2023 monitoring period was $\boldsymbol{\Delta C_{DIST-IL|PRJ}}$ **= 19,275 tCO2e**. Considerations on the significance of this emission source are then given below in Section 5.4.

Net greenhouse gas emission in the project scenario

This section calculates $\Delta C_{NET,t|PRJ}$, the net greenhouse gas emissions in the project scenario in year t, in tCO_2e. Calculations can be found in the '*PRJ_ExPost*' sheet of the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5' spreadsheet).

The net greenhouse gas emissions in the project scenario are the sum of net greenhouse gas emissions resulting from fire and non-fire forest disturbance, plus any carbon stock changes that occur as a result of illegal logging, minus the annual carbon stock change in the aboveground biomass of trees due to forest growth.

Therefore, net greenhouse gas emissions in the project scenario in year t, are calculated as:

$$\Delta C_{NET,t|PRJ} = \left(\Delta C_{DIST-FR,t|PRJ} + \Delta C_{DIST,t|PRJ} + \Delta C_{DIST-IL,t|PRJ}\right) - \Delta C_{AB,t|PRJ} \quad (38)$$

Where:

$\Delta C_{NET,t\|PRJ}$	Net greenhouse gas emissions in the project scenario in year *t*, tCO_2e;
$\Delta C_{DIST-FR,t\|PRJ}$	Net greenhouse gas emissions resulting from fire disturbance in year *t*, tCO_2e;
$\Delta C_{DIST,t\|PRJ}$	Net greenhouse gas emissions resulting from non-fire natural disturbance in year *t*, tCO_2e ;
$\Delta C_{DIST-IL,t\|PRJ}$	Net carbon stock changes as a result of illegal logging at time *t*, tCO_2e;
$\Delta C_{AB,t\|PRJ}$	Annual carbon stock change in aboveground biomass of trees in year *t*, $tCO_2e \cdot y^{-1}$; and
t	1, 2, 3, … t^* years elapsed since the start of the project activity.

The net greenhouse gas emissions across the project scenario in the monitoring period (Table 3)*Table 3* were calculated as:

$$GHG_{NET|PRJ} = \sum_{t=1}^{t^*} \Delta C_{NET,t|PRJ} \quad (39)$$

Where:

$GHG_{NET\|PRJ}$	Net greenhouse gas emissions in the project scenario since the start of the project activity, tCO_2e;
$\Delta C_{NET,t\|PRJ}$	Net greenhouse gas emissions in the project scenario in year *t*, tCO_2e;
t	1, 2, 3, … t^* years elapsed since start of the project activity.

Table 3 Project emissions calculated ex-*post* for the second monitoring period (from the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5 spreadsheet)

Monitoring year	$GHG_{NET\|PRJ}$ (tCO2e)
2022	7,790
2023	7,790
Total	**15,580**

Finally, it was demonstrated that emissions resulting from natural forest disturbances were not present in the project area during the monitoring period, while emissions associated with illegal activities were present. However, as will be presented in Section 5.4, the GHG emissions related to illegal activities are deemed as de minimis, since are less than 5% of the total GHG benefits (*VCS Methodology Requirements v4.2*, Section 3.3.6). Thus, GHG emissions and reductions for the project scenario during the monitoring period can be considered as zero. Ex-post calculations of $GHG_{NET|PRJ}$ during the monitoring years (2022-2023) were thus equal to 0 tCO2e.

5.3 Leakage Emissions

Leakage was calculated according to the same rationale explained in the Joint Validation and Verification VCS document[89]. Leakage calculations are presented in the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5 spreadsheet.

Activity shifting leakage

The VCS VM0010 v1.3 methodology requires that "when the project proponent has control only over resource use in the project area and has no access to other forest resources, then the only type of leakage emissions calculated is GHG emissions due to market effects that result from project activity" (Section 8.3.1). Since the only logging concession held by LFB is the forestry resource rights of UFA 10-064 (concession number 1060)[90], the only leakage to be considered is the market leakage.

Market Leakage

Leakage due to market effects is equal to the net emissions from planned timber harvest activities in the baseline scenario multiplied by an appropriate leakage factor:

$$GHG_{LK|LtPF,t^*} = LF_{ME} * GHG_{NET|BSL,t^*} \quad (40)$$

Where:

$GHG_{LK\|LtPF,t^*}$	Total market leakage as a result of IFM LtPF activities, in the year t^* since the start of the project activity, tCO_2e;
LF_{ME}	Leakage factor for market-effects calculations, dimensionless; and
$GHG_{NET\|BSL,t^*}$	Net greenhouse gas emissions in the baseline scenario in the year t^* since the start of the project activity, tCO_2e.

The leakage factor is determined by considering where in the country logging will be increased as a result of the decreased timber supply caused by the project. If the ratio of merchantable biomass to total biomass is higher in the project area, additional logging will likely be performed in these areas as a result of reduced logging in the project area in the project scenario. The leakage factor is thus defined as a dimensionless number with values between 0 and 1 assigned ex-ante based on a comparison between the ratio of merchantable biomass to total biomass across all strata in the base year, and the ratio of merchantable biomass to total biomass of the country's forest estate where harvesting would likely be displaced to. If the areas liable to be logged have a ratio of merchantable biomass to total biomass higher than the one in the project area, the proportional leakage is likely

[89] Referring to Forest Conservation in Boumba-et-Ngoko (Version 4.1.), issued on 17 July 2023; section 4.3. Leakage

[90] Cameroon's Forest Estate - 2021

higher and vice versa. Therefore, each project must calculate within each stratum the ratio of merchantable biomass to total biomass (PMP_i). This shall then be compared to the ratio of merchantable biomass to total biomass for each forest type (PML_{FT}). The factors to be calculated during this monitoring period are the PMP_i for each forest stratum *i*.

Calculation within each stratum of the ratio of merchantable biomass to total biomass (PMP_i)

The calculations of the ratios of merchantable biomass to total biomass for the two UFA 10-064 AACs (5.1. and 5.2.) that would have been logged during the monitoring period (2022-2023) are presented in the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5 spreadsheet ('MarketLeakage_PA' sheet). The merchantable biomass was calculated taking into consideration the wood densities for the tree species present in each forest stratum and a specific biomass expansion fraction to transform the wood volume to biomass (see the calculation file for more details on those parameters). The total biomass in those areas was calculated using a dataset of total above-ground biomass at 100-m resolution (version 4) developed through remote sensing measurements by ESA, for the year 2017[91]. Finally, the ratio of merchantable to total biomass is calculated (for the Project area):

- PMP_{DHC} = **7.69 %**
- PMP_S = **5.34 %**

Calculation of the ratio of merchantable biomass to total biomass for each forest type (PML_{FT})

This value is calculated at validation and it is presented in Section 4.1.

Leakage factor calculation

Finally, the leakage factor was calculated based on the above calculations. In summary:

- PML_{Forest}/PMP_{DHC} = **15.9%**
- PML_{Forest}/PMP_S = **66.9%**

Since the PML_{Forest} is > 15% greater than the *PMP* in both forest strata, the leakage factor calculated for the monitoring period is:

LF_{ME} **= 20%**

Table 4 Leakage emission values calculated ex-post for the second monitoring period (from the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5 spreadsheet)

Monitoring year	$GHG_{NET\|BSL,t^*}$ (tCO2e)	$GHG_{LK\|LtPF,t^*}$ (tCO2e)

[91] ESA Biomass Climate Change Initiative. Data are accessible at: https://catalogue.ceda.ac.uk/uuid/af60720c1e404a9e9d2c145d2b2ead4e

2022	272,679	54,536
2023	324,049	64,810
Total	**596,728**	**119,346**

5.4 GHG Emission Reductions and Carbon Dioxide Removals

Significance of the project and leakage emissions

In line with the *VCS Methodology Requirements v4.2* (Section 3.3.6), it was demonstrated that the project and leakage emissions amount to less than 5% of the total GHG benefits generated by the project. The results are presented in the '*Significance*' sheet of the ex-post calculations spreadsheet.

Project emissions were only the ones related to the potentially illegal activities during the monitoring period: it was verified that these amounted to 4.2% of the net GHG emission reductions and removals generated by the project. They were thus considered below *de minimis*, hence not significant during the monitoring period.

The leakage emissions accounted instead for 25.8% of the net GHG emission reductions and removals by the project, so they were considered above *de minimis*.

GHG Emissions Reductions during the monitoring period

The calculations for GHG Emission Reductions from the implementation of project activities are presented in the 'VCU' sheet of the 'ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v5" spreadsheet. Net GHG emission reductions *were* calculated as:

$$GHG_{CREDITS|LtPF,t^*} = GHG_{NET|BSL,t^*} - GHG_{NET|PRJ,t^*} - GHG_{LK|LtPF,t^*} \quad (41)$$

Where:

$GHG_{CREDITS\|LtPF,t^*}$	Project greenhouse gas credits associated with the implementation of improved forest management (IFM) activities in the year t^* since the start of the project activity, in the project scenario, tCO_2e;
$GHG_{NET\|BSL,t^*}$	Net greenhouse gas emissions in the baseline scenario in the year t^* since the start of the project activity, tCO_2e;
$GHG_{NET\|PRJ,t^*}$	Net greenhouse gas emissions in the project scenario in the year t^* since the start of the project activity, tCO_2e; and
$GHG_{LK\|LtPF,t^*}$	Total greenhouse gas emissions due to leakage arising outside the project boundary as a result of the implementation of improved forest management (IFM) activities in the year t^* since the start of the project activity, in the project scenario, tCO_2e

At this stage, the significance of the project and leakage GHG emissions were then tested, according to the guidelines set down in the *VM0010 v1.3* (Section 8.2), which point to the *VCS Methodology Requirements v4.2* (Section 3.3.6): "*Specific carbon pools and GHG sources, including carbon pools and GHG sources that cause project and leakage emissions, may be deemed de minimis and do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than 5% of the total GHG benefit generated by the project.*" Thus, GHG emissions related to illegal disturbances and leakage were tested for significance: results can be verified in the '*Significance*', located in the *ex-post* calculations spreadsheet. Leakage emissions were identified as significant (25.8% of total GHG benefits generated by the project), while the emissions related to illegal disturbances were not significant (3.4%). Emissions related to the project scenario in the current monitoring period can thus be considered as zero.

The *ex-post* total net greenhouse gas emissions for the baseline scenario during the 2022-2023 monitoring period was 596,728 tCO2e (presented in the 'BSL_ExPost_total' sheet, see Table 2 in Section 5.1). The total project emissions and removals were instead verified as zero (Section 5.2). The leakage amounted to 119,346 tCO2e (see Table 3 in Section 5.3). Thus, the net GHG emissions and removals are $GHG_{CREDITS|LtPF,t*}$ = 477,382 tCO2e, after the deduction of the leakage[92].

Adjustment for uncertainty

Estimated greenhouse gas emissions and emission reductions from IFM activities have uncertainties associated with parameters and coefficients including estimates of area, carbon stocks, regrowth and expansion factors. For the current project, the uncertainty value was obtained by propagating errors on the baseline mean extractable timber values, biomass expansion factor, and regrowth factor. The previous values referred to the baseline scenario. The calculations were carried out by applying the formulas for combining uncertainties in the '2000 IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories' (Chapter 6, 'Quantifying Uncertainties in Practice').

For both the baseline and the project scenario the total uncertainty is equal to the square root of the sum of the squares of each component uncertainty and it is calculated at the time of reporting through propagating the error in the baseline stocks and the error in the project stocks. Therefore, the total uncertainty for the LtPF project was calculated as:

$$U_{total|LtPF} = \sqrt{U^2{}_{|PRJ} + U^2{}_{|BSL}} \quad (42)$$

[92] These calculations are presented in the "ExPost_BoumbaAndNgoko-VCS2897_VM10_Ver2-22-23-v2" spreadsheet, in the "VCU" tab

Where:

$U_{total\|LtPF}$	Total uncertainty for LtPF Project, dimensionless;
$U^2{}_{\|PRJ}$	Total uncertainty for the improved forest management activities in the project scenario, dimensionless; and
$U^2{}_{\|BSL}$	Total uncertainty for the baseline scenario, dimensionless.

The total uncertainty for the monitoring period ($U_{total|LtPF}$) was estimated as 14.6% and calculations are presented in the 'Uncertainty' sheet in the *ex-post* spreadsheet. Since this value is ≤15%, it does not apply for deductions.

Adjustment for non-permanence risk

The activities implemented in the current project fall under the Improved Forest Management (IFM) AFOLU category. This project is thus required to assess permanence risk (VCS Standard v4.7, Section 3.2.10). Following the application of the VCS AFOLU Non-Permanence Risk Tool v4.2, the amount of GHG emission reductions was adjusted to account for risk. Therefore, the amount of VCUs that can be issued at time t=t2 (the date of verification) for monitoring period T=t2-t1, was calculated as:

$$VCU_{net|LtPF} = \left(Credits_{total,t2|LtPF} - Credits_{total,t1|LtPF}\right) - Bu_{|IFM-VCS} \quad (44)$$

Where:

$VCU_{net\|LtPF}$	Number of verified carbon units; dimensionless;
$Credits_{total,t1\|LtPF}$	Net anthropogenic greenhouse gas removals by sinks, as estimated for t^*=t1 in tCO_2e;
$Credits_{total,t2\|LtPF}$	Net anthropogenic greenhouse gas removals by sinks, as estimated for t^*=t2 in tCO_2e; and
$Bu_{\|IFM-VCS}$	Total number of credits withheld in VCS AFOLU pooled buffer account

The total non-permanence risk estimated during the monitoring period is 24% (pieces of evidence and supporting information were uploaded to the VERRA Project Hub). Concerning the previous monitoring period, this value is considerably higher since the new version of the AFOLU NPRT (version 4.2) is more conservative concerning the project longevity safeguards. Moreover, also the Natural Risks table has increased the risk rating for the natural occurrences. For the monitoring period, the total number of buffer credits *was* thus calculated as 114,572 tCO2e.

State the non-permanence risk rating (%)	24%	
Has the non-permanence risk report been attached as either an appendix or a separate document?	☒ Yes	☐ No

For ARR and IFM projects with harvesting, state, in tCO_2e, the Long-term Average (LTA).	
Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☒ No The current project is not an IFM project with harvesting.
State, in tCO_2e, the expected total GHG benefit to date.	362,811
If a loss occurred (including a loss event or reversal), state the amount of tCO_2e lost:	No loss event occurred in the project at the current date.

Applying the previous deductions, the total VCUs eligible for issuance for the monitoring period 2022-2023 are 362,811 tCO2e.

Vintage period	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage emissions (tCO_2e)	Buffer pool allocation (tCO_2e)	Reductions VCUs (tCO_2e)	Removals VCUs (tCO_2e)	Total VCU issuance (tCO_2e)
01-Jan-2022 to 31-Dec-2022	272,679	0	54,536	52,354	165,789	0	165,789
01-Jan-2023 to 31-Dec-2023	324,049	0	64,810	62,217	197,022	0	197,022
Total	**596,728**	**0**	**119,346**	**114,572**	**362,811**	**0**	**362,811**

Finally, the percentage difference between the ex-ante estimated reductions/removals and the ex-post values for the current monitoring period is presented below, with an explanation of the value obtained.

Vintage period	Ex-ante estimated reductions/ removals	Achieved reductions/ removals	Percent difference	Explanation for the difference
01-Jan-2022 to 31-Dec-2022	196,329	165,789	-18%	The difference is explained by the different value of the non-permanence risk factor between the validation and first verification (10%) and the value of the same factor in the current monitoring period (24%)
01-Jan-2023 to 31-Dec-2023	233,315	197,022	-18%	The difference is explained by the different value of the non-

				permanence risk factor between the validation and first verification (10%) and the value of the same factor in the current monitoring period (24%)